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Dated: September 23, 2004 Signature: E. Thomas Cebeelock
(E. Thomas Wheelock)

Docket No.: 430672000101
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Patent Application of:

James F. GAUSLING and Stacey L. MORAN

Application No.: 09/708,766 Technology Center: 3700

Filed: November 7, 2000 Art Unit: 3727

For: ERGONOMIC BOOKPACK

SUPPLEMENTAL APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This Supplemental Appeal Brief is in response both to the final rejection of claims 1-26 in an Office Action dated June 26, 2002 (Paper No. 7) and to a subsequent Non-Final Office Action mailed on March 23, 2004 (Paper No. 14). A Notice of Appeal was timely filed on December 20, 2002.

Appellants request reinstatement of the Appeal under 37 CFR 1.193(b)(2)(ii).

Any required petition for extension of time for filing this Supplemental Brief and associated fees is dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This Supplemental Brief is transmitted in triplicate and is organized using the headings suggested in 37 C.F.R. § 1.192 and M.P.E.P. § 1206.

Although this Supplemental Appeal Brief is to be only "supplemental" in nature, presumably to reply only to new points raised by the subsequent Office Action, Appellants wish to note that the non-Final Office Action (Paper No. 14) did not specifically withdraw any of the final rejections found in the Office Action (Paper No. 7), but only tersely re-opened prosecution noting that "A new ground of rejection is set forth below." Consequently, and in an excess of caution, Appellants consider the rejections found both in the original Final Rejection (Paper No. 7) as well as the new rejection recited in the later non-Final Office Action (Paper No. 14) to be the subject of this continuing Appeal.

Additionally, the new Office Action has raised objections to the drawings under 37 C.F.R. 1.83(a). Such objections cannot be subject matter in this appeal, but since a reply to the objection must be made to prevent abandonment of the application and yet no amendments are allowed under 37 CFR 1.193(b)(2)(ii), a proffered reply is attached to this Supplemental Brief as Attachment I. Appellants will file the attached reply if then needed when the application resumes *ex parte* prosecution.

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is:

ZERO g TECHNOLOGIES, LLC, a California limited liability company.

II. RELATED APPEALS AND INTERFERENCES

There are currently no other appeals or interferences that would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

However, a continuation of this application, having Serial No. 10/161,300, is in *ex parte* prosecution before the same Examiner. That application is under final rejection on many of the same issues as are to be considered here. A Notice of Appeal was filed on March 1, 2004. An Appeal Brief will be filed in that application prior to October 1, 2004.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 26 claims pending in application. A true copy of the claims on appeal is included in the Appendix as Attachment 2.

B. Current Status of Claims

1. Claims canceled: None

2. Claims withdrawn from consideration but not canceled: None

3. Claims pending: 1-26

4. Claims allowed: None

5. Claims rejected: 1-26

C. Claims On Appeal

The claims on appeal are claims 1-26

IV. STATUS OF AMENDMENTS

An Amendment under 37 CFR 1.116 was filed on December 20, 2002 (Paper No. 10) but was not entered per an Advisory Action dated March 7, 2003 (Paper No. 11) as raising "new issues that would require further consideration," more specifically that "the amended claims require further search and consideration since the dependency of claims 2-7 are now from newly independent claims."

No amendment has been filed in response to the non-Final Office Action, dated March 23, 2004 (Paper No.14), because of the prohibition under 37 CFR 1.193 (b)(2)(ii) when renewing an appeal.

V. SUMMARY OF INVENTION

[The Summary just below is taken from the earlier Appeal Brief.]

This patent application may be best explained as directed to a backpack that is supported from the wearer's shoulders by straps that are attached to the backpack body in such a way that the center of gravity of the backpack is shifted inwardly and closer to a wearer's back. Pressure from the weight of the pack is more evenly distributed on that wearer's back and shoulders.

Figure 9 in the application shows the conceptual advantages of the pack. The backpack body 200 includes, in the depicted variation, shoulder straps 300 that are attached to the body of the pack in such a way that top straps or members 600, working alone or in conjunction with top support members 640, act through the points of attachment to the backpack to "redirect the forces acting along the shoulder straps 300 along the top straps 600, again reducing the load placed on the wearer's shoulders." See page 25 of the application.

Again, in concept, the invention described in the application includes a number of backpack structures that improve the comfort of the backpack by shifting the center of gravity towards the back of the wearer.

There are a number of different ways in which this desired function is accomplished. The variation found in independent claims 1, 8, and 15 require that the shoulder support strapping be attached to the backpack body at a junction between a "top region" and an "outer region". The explanation of what a "region" is with respect to the described backpack may be found beginning at about page 4 as that material explain Figure 2. That material explains that a backpack body may have a "topside or region 202" and "an outer side or region 208" and where those regions are located. These terms have been used consistently throughout the prosecution of this application, but have not apparently been applied in the Office Action

VI. ISSUES

Appellants wish again to note that the non-Final Office Action (Paper No. 14) did not specifically withdraw any of the final rejections found in the Office Action (Paper No. 7), but only tersely re-opened prosecution noting that "A new ground of rejection is set forth below." Appellants consider the rejections found in both the original Final Rejection (Paper No. 7) and those recited in the later non-Final Office Action to be on appeal.

Issues from the earlier Final Rejection

The issues on appeal that correspond directly to the rejections recited in the final Office Action, are:

A1.) Whether claims 1-26 are properly rejected under 35 USC 112, paragraph 2, as failing to set forth the subject matter regarded as applicant's invention. Specifically, whether each of the claims fails to correspond in scope to "that which applicants regard as the invention." Additionally, whether claims 25 and 26 are indefinite as being "incomplete for omitting essential structural cooperative relationships."

A2.) Whether claims 1, 3, 4, 5, and 15 are anticipated by U.S. Patent No. 6,130,616, to Sizemore.

A3.) Whether claims 1, 7-9, 11-13, 15, 16, and 21 are anticipated by U.S. Patent No. 6,024,265, to Clements.

A4.) Whether claims 6, 14, and 17 are properly rejected under 35 USC 103(a) as unpatentable over Clements (above) in view of U.S. Patent No. 6,179,187, to Lemire et al.

A5.) Whether claims 2, 10, and 18-26 are appropriately rejected under the judicially created doctrine of obviousness type double patenting as unpatentable over claims 1, 16, and 19 of U.S. Patent No. 6,164,509, the parent patent to this application.

Issues from the later non-Final Rejection

The issues recited are:

B1.) Whether claims 3, 12, 25, and 26 are appropriately rejected under 35 USC 112, first paragraph, as failing to comply with the written description requirement.

B2.) Whether claims 3, 12, 25, and 26 are appropriately rejected under 35 USC 112, second paragraph, as indefinite or incomplete.

B3.) Whether claims 1, 3, 4, 5, and 15 are appropriately rejected under 35 USC 102(e) as being anticipated by U.S. Patent No. 6,130,616, to Sizemore.

B4.) Whether claims 1-4 and 6-20 are appropriately rejected under 35 USC 102(e) as being anticipated by U.S. Patent No. 6,024,265, to Clements.

B5.) Whether claims 1, 3, 6, 7, 15, and 17 are appropriately rejected under 35 USC 102(b) as being anticipated by Floyd, Great Britain Patent No. 1400.

B6.) Whether claims 1, 2, 6, 7, 10, 14, 15, 17, 18, 21, 22, and 24 are appropriately rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 14, 16, 18, and 19 of US Patent No. 6,164,509.

B7.) Whether claims 4, 5, and 13 are appropriately rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of US Patent No. 6,164,509 in view of Sizemore.

VII. GROUPING OF CLAIMS

For the purposes of this appeal only, the claims on appeal rise or fall together.

VIII. ARGUMENTS

Appellants' counsel understands that there is substantial overlap between the two sets of rejections. In some instances, the overlapping rejections have been slightly revised in their later form by emphasizing different portions of the cited references or by adding or subtracting claims under rejection. Appellants desire to minimize the scope of additional argument required by presenting the arguments in the following format. First, the rejections from the earlier final rejection (as found in Paper No. 7) and Appellants' responses there will be taken from that earlier Brief and repeated here. Then, a separate section specifying, as best as can be assessed, the changes from the earlier rejections to the later ones will be provided. The changes will be shown in **bold** in that section. If the changes merit a new response, such will be provided. If only additional comments are necessary, such will be done. If a rejection is new to the later rejection, a new response will be provided.

REJECTIONS FROM PAPER NO. 7

A1.) 35 USC § 112, second paragraph

Claims 1-26 stand finally rejected under 35 USC 112, second paragraph, as failing to set forth the subject matter which appellants regard as their invention. In support of the rejection, the Office Action states:

> "Evidence that claims 1, 8, and 15 fail to correspond in scope with that which applicants regard as the invention can be found in U.S. Patent No. 6,164,509 filed July 19, 1999. In that application, applicants have stated that *at least one side support member disposed adjacent one of the lateral sides and having a proximate end connected to the backpack body at a second juncture between the outer side and one of the lateral sides and a distal end connected to one of the shoulder support members*, which was a reason for allowance over the prior art. This statement indicates that the invention is different from what is defined in the claims because there is no support for the breadth of the claims as presented in the original application.

"Claims 25 and 26 are rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

"Claim 25 is rejected to under 35 USC 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: the distal ends of the two shoulder support members connected to each other.

"The dependent claims not specifically mentioned are rejected as being dependent upon a rejected base claim, since they inherently contain the same deficiencies therein."

Appellants disagree.

It is appropriate under the statute[1] to reject a claim as not drawn to an applicant's invention where there exists evidence in an amount of necessary to overcome both the statutory presumption that what is claimed in a patent application is, in fact, the invention an applicant wishes to claim and the observations by the United States Court of Appeals for the Federal Circuit that: "without evidence to the contrary, an Examiner generally should presume that a claim recited what the applicant regards as his invention." See *Litton Systems, Inc. v. Honeywell, Inc.,* 140 F.3d 1499, 46 USPQ2d 1321 (Fed. Cir. 1998), *petition for reh'g denied and suggestion for same reh'g in Banc declined*, 145 F.3d 1472, 47 USPQ2D 1106 (Fed. Cir. 1998) and *In Re Moore,* 439 F.2d 1232, 1325, 169 USPQ 236, 238 (CCPA 1971). The final rejection here urges that the Examiner's Amendment and the included Reason for Allowance over the prior art, the Reasons being found in the parent patent, is in fact evidence that the Appellants-Applicants intended to claim an invention different than that found in the claims on appeal.

A simple reading of the words in that Examiner's Amendment as quoted above from the final rejection say only that certain limitations in the claims are not found in the prior art. There are

[1] 35 USC 112, paragraph 2 indicates that:

no "mandatory" words there, such as the "invention must include..." or words of exclusion "my invention does not include..." There has been no explanation in the prosecution in this application how the apparently simple explanation of why those claims were allowed, by the examiner in the parent application/patent, transmogrified into a rigid definition-of-invention that could not be varied.

Appellants note that the reasons for allowance cited there are accurate but cannot be seen as the source of an admission by Appellants that the "invention" (as that word is used in the statute) is somehow different from that found in the claims. The citation in the Examiner's Amendment in the parent application is believed to be accurate as it relates to the claims finally allowed. It is not relevant to the claims on appeal that recite a different variation of the conceptual invention nor is that quote seen as an admission that relates to anything other than the finally allowed claims there.

The MPEP (Section 2172) even indicates in the section labeled "III. SHIFT IN CLAIMS PERMITTED" that the second paragraph of USC 112 does not ":prohibit applicants from changing what they regard as their invention during the pendency of the application" citing *In Re Sanders*, 444f second 599, 170 USPQ 213 (CCPA 1971). The MPEP further notes in explaining that case, that:

> "The fact that claims in a continuation application were directed to originally disclosed subject matter which applicants had not regarded as part of their invention when the parent application was filed was held not to prevent the continuation application from receiving benefits of the filing date of the parent application under 35 USC 120. Citing *In Re Brower*, 433 F.2d 813, 167 USPQ 684 (CCPA 1970)."

Even if Appellants are considered to have shifted their invention for reasons of whimsy, the Appellants are entitled to do so if they pay the fees. They have paid the fees.

The final rejection under 35 USC 112, paragraph two, is in error and should be reversed.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention."

There have been instances under which the Federal Circuit, in interpreting 35 USC 112, paragraph one, has found that a patent applicant has claimed material that had not been "described" in the manner required by that statute. Typical of the cases under 35 USC 112, paragraph one, showing failure to adhere to the written description requirement is *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 45 USPQ2d 1498 (Fed. Cir. 1998). However, the rejection on appeal relies not on a demonstration in the final rejection that the claims failed to adhere to the description requirement, but instead were said only to not agree in scope with what the "applicant considered to be his invention."

Reversal of this rejection is requested.

Claims 25 and 26

The claims 25 and 26 stand finally rejected as "indefinite" or "incomplete for omitting...relationships of elements...[specifically]...The distal ends of the two shoulder support members connected to each other."

Appellants disagree. Appellants note that they have not anywhere specified that it is somehow necessary or essential that the "distal ends" of the "shoulder support members" necessarily be connected to each other as a feature of the invention. Such is a variation, of course. That those two ends are connected to each other is in fact required by claim 25. Since the specific "omission" is not in fact an omission -- the words are found in claim 25 -- it is not clear why, even in the view noted in the final Office Action, why the claims are considered to be unclear.

Additionally, claim 25 is indicated to be "incomplete for omitting essential cooperative relationships of elements, such omission amounting of a gap between the necessary structural connection." Again, the allegedly omitted "structural cooperative relationships" were said to be that "the distal ends of the two shoulder support members connected to each other." Since these words are found in claim 25, Appellants are at a loss as to how to respond to the rejection, variously by

argument or amendment or in some other manner, to rectify the question raised in the final rejection.

A reversal of this rejection is requested.

A2.) Rejections under 35 USC § 102 - Sizemore

Claims 1, 3, 4, 5, and 15 stand finally rejected under 35 USC 102(e) as anticipated by Sizemore (U.S. Patent No. 6,130,616). In support of the rejection the Office Action states:

Sizemore discloses an ergonomic backpack comprising:

- "A backpack body (1);
- "A plurality of shoulder support members (2), each having a proximal and connected to the body at first transition region (Figure 3);
- "The body comprises a single, seamless, continuous member to the degree applicant claims:
- "The backpack is comprised of nylon with a fineness between 500 denier and 1050 denier (Column 5, lines 27-28); and
- "A plurality of straps (Figures 1-3)."

Appellants disagree.

Each of the appealed independent claims requires that "each shoulder support member proximal end [be] connected to the backpack body at a first transition region between the top region of the backpack body and an outer region of the backpack body."

The final rejection merely notes that the Sizemore backpack has a "proximal and [sic - "end"] connected to the body at a first transition region (Figure 3)..." Figure 3 appears to show a backpack of some kind -- also shown in Figures 1 and 2 -- upon which the shoulder straps are attached to a junction at the top of the backpack body near the wearer's body. As Appellants noted above, the meaning of upper and outer and side regions is discussed in the specification. The final Office Action fails to recite the factual basis, the pictures or words, in the Sizemore patent upon

which the claim elements specified by the terms "outer region" and "side region" are supposedly anticipated. The final Office Action simply does not mention these terms nor does it lead to one reading that Office Action to where in the patent such a specific connecting region may be found. The reason is also a simple one: connecting the shoulder straps to the backpack body at a region between the "outer region" and "side region" is not disclosed.

Moreover, in assessing the remainder of the Sizemore patent, there is no indication that the backpack disclosed in Sizemore has a variation in which the shoulder members are attached in any other fashion to the backpack body.

In sum, the Sizemore patent simply does not show all of the elements found in appealed claims 1, 3, 4, 5, and 15 and does not therefore anticipate them.

A reversal of this rejection is respectfully requested.

A3.) 35 USC § 102 - Clements

Claims 1, 7-9, 11-13, 15, 16, and 21 stand finally rejected under 35 USC 102(e) as being anticipated by Clements (U.S. Pat. No. 6,024,265). In support of the rejection the Examiner states:

"Clements discloses an ergonomic backpack comprising:

- A backpack body (1):
- A plurality of shoulder support member (11), each having a proximal end connected to the body at first transition region (Figure 4);
- An adjustable hip belt (12) attached to the backpack body, wherein the hip belt is comprised of two pieces, each respectively attached to a lateral side (Figures 4 and 5);
- The body comprising a single , seamless, continuous member to the degree applicant claims;
- The backpack is comprised of nylon;
- A plurality of straps (Figure 1);
- The hip belt is attached to the backpack body at one or more of the straps (Figure 1); and

- "The distal end of each shoulder support member is connected to the backpack body at a second transition region between the outer region of the backpack and a lateral side region of the backpack (Figure 6), to the same degree appellant claims."

Appellants disagree.

As a matter of simplicity, in this argument, Appellants note that the final Office Action indicates that the patent shows "a plurality of shoulder support members (11), each having a proximal end connected to the body at a first transition region (Figure 4)". Again, the final Office Action fails to show where in the Clements patent may be found, the elements "first transition region" between a "top region of the backpack body" and "an outer region of the backpack body." The number of words in claim 1 specifying these elements constitute about one-third of the words there.

Furthermore, it is noted that Clements' Figure 4 shows what appears to be shoulder straps being attached or connected to the backpack body at an area of the backpack closest to the wearer's body. That attachment point, by Appellants' attorney's estimate, to be between the wearer's shoulder blades when the backpack is worn. That attachment or connection site does not appear in any way to be at a site near a top or outer portion of the Clements' backpack body. Additionally, there is no discussion of another variation in the Clements patent indicating that such a variation would be desirable.

Since the final rejection over Clements is inappropriate for not specifying where each of the claimed elements may be found in the cited patent and, indeed, the shoulder straps appear factually to be connected to the backpack body in some other fashion, reversal of the rejection is completely appropriate.

A4.) 35 USC § 103 - Clements v. Lemire et al.

Claims 6, 14, and 17 finally stand rejected under 35 USC 103(a) as being unpatentable over Clements in view of Lemire et al. In support of the rejection the Office Action states:

> "Clements discloses all of the limitations of claims 6, 14, and 17 except the backpack body comprising a yoke disposed along the top region and connected to each shoulder support member. However, Lemire teaches a backpack having a yoke (9) disposed along the top region and connected to each shoulder support member. It would have been obvious to attach the yoke of Lemire to the backpack of Clements. Doing so would provide an alternate means of attaching the shoulder support members to the backpack and allow more comfort to the wearer."

Appellants disagree.

The Lemire et al. patent fails to provide the material otherwise not found in the Clements et al. patent. The Lemire et al. patent does show a yoke but does not provide disclosure of a structure in which a shoulder support member has a proximal end connected to a backpack body between a top section of that body and an outer section of that body. Again, insofar as understood what is disclosed by the two patents, the ends of the shoulder straps are attached to the side of the backpack nearest body. Such connection or attachment site is not what is required by the claims.

Reversal of the rejection is therefore requested.

A5.) Double Patenting Rejection

Claims 2, 10, and 18-26 stand finally rejected under the judicially created doctrine of obviousness-type double patenting as unpatentable over claims 1, 16 and 19 of U.S. Patent No. 6,164,509 (copy included as Attachment ~~[2]~~ 3). In support of the rejection, the Office Action notes:

> "Although the conflicting claims are not identical, they are not patentably distinct from each other because they claim the same subject matter that made the claims allowable over the prior art."

Appellants disagree.

Appellants believe that the test cited in the final Office Action -- "they [the respective two sets of claims] are not patentably distinct from each other because they claim the same subject matter that made the claims allowable over the prior art" -- is legally erroneous. If that is the standard applied in the final Office Action, Appellants urge reversal on that basis alone. Comparing the two sets of claims to the prior art is not the test.

So far as is determined from the case law, a rejection under judicial double-patenting involves only a comparison of the claims in the application to those in the patent. As MPEP 804 notes, the rejection is "based on a judicially created doctrine grounded in public policy in which is primarily intended to prevent prolongation of the patent term by prohibiting claims in the second patent not patentably distinguishing from claims in the first patent." MPEP section 804 further goes on to note that:

> "... any obviousness-type double patenting rejection should make clear:
>
> "(A) the differences between the inventions defined by the conflicting claims--a claim in the patent compared to a claim in the application;
>
> (B) the reasons why a person of ordinary skill in the art would conclude that the invention defined in the claim in issue is an obvious variation of the invention defined in a claim in the patent."

There has been no such analysis in the two Office Actions provided. Furthermore, it is not apparent from a reading of the two sets of claims -- and the contents of those claims -- how the conclusion provided in the final Office Action was made. Indeed, claim 1 of the parent '509 patent requires that the shoulder support member proximal end be connected to the backpack body at a juncture "between the top side and the body side." The claims here, it will be remembered, require that the support member be connected between a "top region" and an "outer region."

Consequently, in a factual sense, the Appellants have not been provided with any analysis of why a connection of the shoulder straps to one section of the backpack body would render those straps' connection to another portion of the backpack body to be obvious in the sense required by a judicial obviousness-type double-patenting rejection

In summary, the test applied in the final Office Action is not supported in the case law. The Office Action has not provided, under a proper test of judicial double patenting, any reason why the differing limitations found in the claims of this appealed application would be obvious from the apparently disparate connection regions recited in the claims of the parent case.

Reversal of this rejection is requested.

REJECTIONS FROM PAPER NO. 14

B1.) 35 USC § 112, first paragraph

Claims 3, 12, 25, and 26 are rejected under 35 USC 112, first paragraph, as failing to comply with the written description requirement. In support of the rejection the Office Action states:

> "The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. There is no disclosure on how to make the backpack seamless and there is insufficient disclosure for the distal ends of the shoulder support members connected to each other."

[This rejection is new; it was not present in the Final Rejection.]

Appellants disagree with the rejection both as insufficiently explained and as legally improper.

First of all, claims 3 and 12 are original claims. The word "seamless" is found both in claim 3 and in claim 12. The warmly remembered CCPA reached a conclusion when faced with the question such as is raised here by stating that "an original claim is its own written description." See *In re Gardner*, 475 F.2d 1389, 177 USPQ 396, *pet. for reh'g. and recon. denied*, 480 F.2d 879, 178 USPQ 149 (1973); *In re Wertheim et al*, 541 F.2d 257, 191 USPQ 90, 96 (CCPA 1976).

This is sufficient basis upon which to reverse the rejection of originally filed claims 3 and 12. Such a reversal is requested.

Secondly, even the recent cases often considered most harsh on patentees and applicants in dealing with the written description requirement[2], requires that those challenging the sufficiency of a claim, be those persons patent examiners or patent infringement defendants, must come forward with some indicia, some evidence, tending to show that the claimed invention is not described. Indeed, the *Wertheim* case cited just above starkly states: "The burden of showing that the claimed invention is not described in the specification rests upon the PTO in the first instance, and it is up to the PTO to give reasons why a description not *in ipsis verbis* is insufficient." 541 F.2d @ 265.

Here, the rejection states but a conclusion: "there is insufficient disclosure..." without any evidence or argument to back up the conclusion. The "burden of showing" has not been carried forward by "the PTO in the first instance." Consequently, Appellants' presumption of correctness has not been overcome.

Reversal of the rejection of these claims is requested.

[2] See, *Gentry Gallery v Berkline*, 134 F.3d 1473, 45 USPQ 2d 1498 (Fed. Cir. 1998) and the *ex parte* cases cited therein.

B2.) 35 USC § 112, second paragraph

Claims **3, 12,** 25, and 26 stand rejected under 35 USC § 112, second paragraph, as indefinite. In support of the rejection the Office Action states:

> **"Claims 3 and 12 are indefinite since it is unclear how the backpack would be made seamless.**
>
> "Claim 25 is rejected to under 35 USC 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: the distal ends of the two shoulder support members connected to each other. The disclosure does not teach or show how this is done.
>
> "The dependent claims not specifically mentioned are rejected as being dependent upon a rejected base claim, since they inherently contain the same deficiencies therein."

[The rejection of claims 3 and 12 on this basis is new. The remainder of the rejection is word-for-word as found in the earlier Final Rejection. Appellants rely upon the arguments provided above for response to the rejection of claims 25 and 26.]

Appellants disagree. The basis for the rejection, i.e., "unclear how the backpack would be made seamless" is legally improper under the second paragraph of 35 USC 112.

This part of the Patent statute[3] is to ensure that a person reading a claim, as eventually patented, is given clear notice what is covered by that claim. That is to say: the claims are OK if that reader sees that the backpack must be "seamless" and understands that to infringe the claim, some allegedly infringing backpack must not have any seams. Additional thinking about: "I wonder how they do that" is not fruitful under this piece of the law. The enablement provisions (i.e., "how to make") of the first paragraph of 35 USC 112 is where that type of evidentiary review is made.

[3] 35 USC 112, paragraph 2 indicates that: "The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention."

The Examiner has made no argument that the term "seamless" is unclear, only that it somehow isn't clear how to make the claimed backpack "seamless."

Since the Office Action did not provide any appropriate basis for supporting a rejection based upon the clarity of claims 3 and 12, the rejection should be reversed.

In sum, the rejection under 35 USC 112, paragraph two, is in error and should be reversed.

B3.) Rejections under 35 USC § 102 - Sizemore

Claims 1, 3, 4, 5, and 15 stand rejected under 35 USC 102(e) as anticipated by U.S. Patent No. 6,130,616, to Sizemore. In support of the rejection the Office Action states:

Sizemore discloses an ergonomic backpack comprising:

- "A backpack body (1);
- "A plurality of shoulder support members (2), each having a proximal and connected to the body at first transition region (Figure 3);
- "The body comprises a single, seamless, continuous member to the degree applicant claims:
- "The backpack is comprised of nylon with a fineness between 500 denier and 1050 denier (Column 5, lines 27-28); and
- "A plurality of straps (Figures 1-3)."

[This rejection is word-for-word the same rejection [A3, as above] as found in the Final Rejection. No additional explanation has been offered despite a review of the arguments found in Appellants' earlier Brief. Appellants rely upon the arguments repeated above in response to the earlier final rejection of these claims as anticipated by Sizemore.]

B4.) 35 USC § 102 - Clements

Claims 1, **2-4**, **6**, 7-9, **10**, 11-13, **14**, 15, 16, and **17-20** stand rejected under 35 USC 102(e) as anticipated by U.S. Pat. No. 6,024,265, to Clements. In support of the rejection the Examiner states:

"Clements discloses an ergonomic backpack comprising:

- A backpack body (1):
- A plurality of shoulder support member (11), each having a proximal end connected to the body at first transition region (**Appendix A**, Figure 4);
- **At least one side support member (Appendix B) disposed adjacent a lateral side region having a proximal end connected to the backpack body at a second transition region between the outer region and the lateral side region and a distal end connected to one of the shoulder support members;**
- An adjustable hip belt (12) attached to the backpack body, wherein the hip belt is comprised of two pieces, each respectively attached to a lateral side (Figures 4 and 5);
- The body comprising a single, seamless, continuous member to the degree applicant claims;
- The backpack is comprised of nylon;
- **A yoke (Appendix A) disposed along the backpack body top region and connected to each shoulder support member;**
- **The bottom region of the backpack has a stiffness (20) higher than a stiffness of the rest of the backpack body;**
- A plurality of straps (Figure 1);
- An **adjustable** hip belt is attached to the backpack body at one or more of the straps (Figure 1);
- **The first hip belt piece is attached to a first lateral side region and the second hip belt piece is attached to a second lateral side region of the backpack body (Figures 4 and 5);**
- **Two side support members (Appendix B), each disposed adjacent the first and second lateral side regions, respectively, and each connected to the backpack body at a second transition region and a shoulder support member;**
- The distal end of each shoulder support member is connected to the backpack body at a second transition region **(Appendix B)** between the

outer region of the backpack and a lateral side region of the backpack (Figure 6), to the same degree appellant claims;

- **A plurality of straps comprising four or more straps, wherein the first two of said straps (9) are parallel to one another and wherein the other two of said straps (28) are parallel to one another and perpendicular to the first two of said straps; and**
- **Each of the first two and second two straps are spaced apart from each other to define an aperture (Figure 2, enclosed by 7) through which the interior of the backpack body is accessible.**

[The bolded claim numbers and citations have been added by the PTO in this non-Final Action. Appellants note that the rejection of claim 21 was not carried forward from the Final Rejection [A3, above] to this non-Final rejection.]

Appellants disagree.

Appellants appreciate the use of Appendix A and Appendix B as an aid in attempting to draw a correspondence between the words in the claims and the structures in the Clements patent. Although the placement of the box marked "1st transition region" and its associated arrow entail substantial artistic license (the "1st transition region" is between the "top region" and the "outer region" -- outer regions are positioned away from the wearer's body) at least the source of misconstrual is understood. If one considers a drawing in Clement having a view of that arguably corresponding "outer region," perhaps Figure 1 or Figure 2, and understand that Appellants' claims require the "shoulder support member" be connected to a "1st transition region" -- if one looks for strap 11 in Figure 1 or 2, strap 11 is attached to the backpack against the body, far away from the area designated by the examiner as the 1st transition region. If Clements' backpack were a world-globe, the 1st transition region would be in Siberia. The ends of strap 11 would be attached at about Costa Rica and Tierra del Fuego.

Appellants have specified this particular difference between the claimed device and the Clements disclosure a number of times during the prosecution, including a lengthy discussion in the earlier Brief. No additional discussion has been forthcoming in an Office Action concerning this most important of points. Appellants' claim limitation relating to the site, the 1st transition region,

for connection to the backpack is found in each of the independent claims (Nos. 1, 8, and 15) under rejection in this section.

Appellants' attorney has limited the scope of response in this rejection with the understanding that it will be addressed in the Examiner's Answer. There are other erroneous holdings in the two rejections on appeal dealing with the Clements reference. Appellants have not conceded those errors, but has neither has discussed them. The concept of operation embodied in the claims in this application is important. For future sleeping ease during periods of litigation, it would be best to have the benefit of the PTO's consideration of the device as completely claimed, specifically considering the site of shoulder support member attachment.

In sum, since Clements does not show connection of a shoulder strap at a region between an outer region and a top region, the anticipation rejection based on Clements is in error and should be reversed.

B5.) 35 USC § 102 - Floyd

Claims 1, 3, 6, 7, 15, and 17 stands rejected under 35 USC 102(b) as anticipated by Great Britain Patent No. 1400, to Floyd. In support of the rejection, the Office Action notes:

"Floyd discloses an ergonomic backpack comprising:

- A backpack body (Figures 1 and 2) comprising a plurality of straps;
- A plurality of shoulder support members (c), each member having a distal end (bottom portion) and a proximal end (top portion), each proximal end connected to the backpack body at a first transition region (at buckle) between a top region (d) and an outer region (edge) of the backpack body (Figure 1);
- The backpack body is a single, seamless, continuous member, to the same degree claimed; and

- A yoke (a) disposed along the backpack body top region and connected to each shoulder support member.

[This is a new rejection.]

Appellants disagree. As was the case with the Clemens reference, no disclosure is seen attaching the shoulder straps to a region between an outer region and a top region.

Reversal is requested.

B6.) Judicial Double Patenting

Claims 1, 2, 6, 7, 10, 14, 15, 17, 18, 21, 22, and 24

Claims 1, 2, 6, 7, 10, 14, 15, 17, 18, 21, 22, and 24 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 14, 16, 18, and 19 of U.S. Patent No. 6,164,509. In support of the rejection, the Office Action notes:

> "Although the conflicting claims are not identical, they are not patentably distinct from each other because the claim the same subject matter".

[This is, in substance, a new rejection.]

Appellants disagree on several bases. First of all, it is unclear how the two sets of claims -- one set from this application and one set from the '509 patent can claim "the same" subject matter and not be identical claims. Because the PTO has failed to follow its own procedural steps as specified in MPEP 804, Appellants have no indication of what the PTO's logic or considerations might be in saying that the respective claims recite the same subject matter. MPEP 804 specifies that:

> "... any obviousness-type double patenting rejection should make clear:
>
> "(A) the differences between the inventions defined by the conflicting claims--a claim in the patent compared to a claim in the application;

(B) the reasons why a person of ordinary skill in the art would conclude that the invention defined in the claim in issue is an obvious variation of the invention defined in a claim in the patent."

Again, Appellants trust that this question will be addressed in the Examiner's Answer in a way that does not simply recite a conclusion. Appellants specifically request it be done.

Secondly, in point of fact, the claims on appeal require connection to the backpack at a region between a top region and an outer region. The '509 patent, in contrast, requires such a connection at a region between the top region and a body-side region; the body side is not an outer region. These are very different spots. How then are the claims somehow the same?

Reversal of this rejection is requested.

Claims 4, 5, and 13

Claims 4, 5, and 13 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,164,509 in view of Sizemore. In support of the rejection, the Office Action notes:

> "The U.S. Patent No. 6,164,509 discloses all of the limitations of the claims, except the backpack body comprised of nylon or a fineness of between 500 denier and 1050 denier. However, Sizemore teaches a backpack comprised of nylon with a fineness between 500 denier and 1050 denier (Column 5, lines 27-28). It would have been obvious to make the backpack disclosed in U.S. Patent No. 6,164,509 of nylon with a fineness between 500 denier and 1050 denier, as taught by Sizemore. Doing so would provide a sturdier, more resilient backpack."
>
> **[This is a new rejection.]**

Appellants disagree. Contrary to the bare assertion in the stated rejection, claim 1 of '509 does not show "all of the limitations of the claims." Specifically, claim 1 of '509 does not show the required point of connection to the pack. If the Office Action truly intends to say that the

patent itself was the source of comparison (and not claim 1), then the rejection is legally improper on its face.

Sizemore does not cure the specific limitation deficiency of claim 1 of '509.

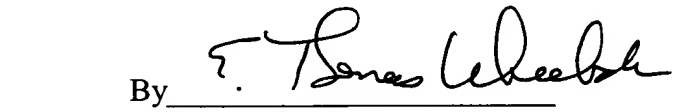
Withdrawal of the rejection is requested.

SUMMARY

The various rejections provided in the final Office Action and the subsequent non-Final Office Action are without either legal basis or are without factual support. Reversal of the rejections is completely appropriate and is requested.

Dated: September 23, 2004

Respectfully submitted,

By 

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ATTACHMENT 1

proffered amendment -- do not file

Docket No.: 430672000101
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

James F. GAUSLING and Stacey L. MORAN

Application No.: 09/708,766 Technology Center: 3700

Filed: November 7, 2000 Art Unit: 3727

For: ERGONOMIC BOOKPACK

DRAWING AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Please approve the proposed amendments made in red on the attached marked up drawing. Corresponding amendments to the specification will be made in a subsequent paper, once the drawings are approved.

Dated: September 23, 2004

Respectfully submitted,

By XXXXX

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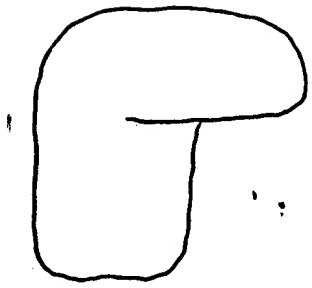

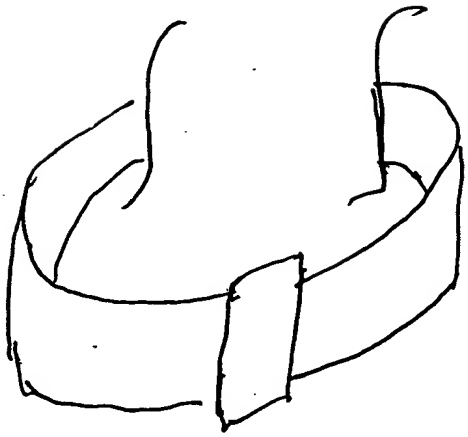

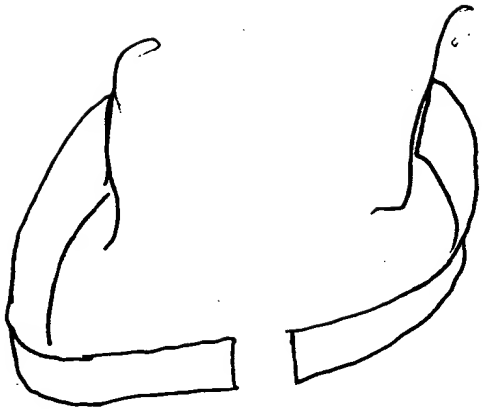

ATTACHMENT 2

CLAIMS ON APPEAL

1. An ergonomic backpack comprising:

a backpack body, and

a plurality of shoulder support members, each shoulder support member having a distal end and a proximal end, each shoulder support member proximal end connected to the backpack body at a first transition region between a top region of the backpack body and an outer region of the backpack body.

2. The backpack of claim 1 additionally comprising at least one side support member disposed adjacent a lateral side region of the backpack body and having a proximal end connected to the backpack body at a second transition region between the outer region and the lateral side region and a distal end connected to one of the shoulder support members.

3. The backpack of claim 1 wherein the backpack body comprises a single, seamless, continuous member.

4. The backpack of claim 1 wherein the backpack body comprises Nylon.

5. The backpack of claim 1 wherein the backpack body comprises a fineness of between about 500 denier and about 1050 denier.

6. The backpack of claim 1 additionally comprising a yoke disposed along the backpack body top region and connected to each shoulder support member.

7. The backpack of claim 1 wherein a bottom region of the backpack body has a stiffness higher than a stiffness of the rest of the backpack body.

8. An ergonomic backpack comprising:

a backpack body,

a plurality of shoulder support members, each shoulder support member having a distal end and a proximal end, each shoulder support member proximal end connected to the backpack body at a first transition region between a top region of the backpack body and an outer region of the backpack body, and

a hip belt attached to the backpack body.

9. The backpack of claim 8 wherein the hip belt comprises a first hip belt piece and a second hip belt piece, each of said first and second hip belt pieces having a distal end and a proximal end,

wherein the first hip belt piece proximal end is attached to a first lateral side region of the backpack body, the second hip belt piece proximal end is attached to a second lateral side region of the backpack body, and each of the first and second hip belt piece distal ends is configured to be releasably connectable to each other.

10. The backpack of claim 8 additionally comprising two side support members, each disposed adjacent the first and second lateral side regions, respectively, and wherein each side support member has a proximal end connected to the backpack body at a second transition region between the outer region and the lateral side region and a distal end connected to one of the shoulder support members.

11. The backpack of claim 8 wherein the hip belt is adjustable.

12. The backpack of claim 8 wherein the backpack body comprises a single, seamless, continuous member.

13. The backpack of claim 8 wherein the backpack body comprises Nylon.

14. The backpack of claim 8 additionally comprising a yoke disposed along the backpack body top region and connected to each shoulder support member.

15. An ergonomic backpack comprising:

a backpack body comprising a plurality of straps, and

a plurality of shoulder support members, each shoulder support member having a distal end and a proximal end, the shoulder support member proximal end connected to the backpack body at a first transition region between a top region of the backpack body and an outer region of the backpack body.

16. The backpack of claim 15 additionally comprising a hip belt attached to the backpack body at one or more of said straps.

17. The backpack of claim 15 additionally comprising a yoke disposed on the backpack body along one of said straps.

18. The backpack of claim 15 additionally comprising two side support members, each disposed adjacent the first and second lateral side regions, respectively, and wherein each side support member has a proximal end connected to the backpack body at a second transition region between the outer region and the lateral side region and a distal end connected to one of the shoulder support members.

19. The backpack of claim 15 wherein the plurality of straps comprises four or more straps, and wherein the first two of said straps are parallel to one another and wherein the other two of said straps are (a) parallel to one another and (b) perpendicular to the first two of said straps.

20. The backpack of claim 19 wherein each of said first two straps and second two straps are spaced apart from each other to define an aperture through which the interior of the backpack body is accessible.

21. The backpack of claim 1 wherein the distal end of each shoulder support member is connected to the backpack body at a second transition region between the outer region of the backpack and a lateral side region of the backpack body.

22. The backpack of claim 21 additionally comprising a member adapted to guide the shoulder support member along a lateral side region of the backpack body.

23. The backpack of claim 21 additionally comprising a ring attached to the lateral side region and having one of said shoulder support members threaded through said ring.

24. The backpack in claim 1 wherein the distal end of each shoulder support member is connected to the backpack body at a third transition region between the outer region of the backpack body and the bottom region of the back pack body.

25. The backpack in claim 1 having only two shoulder support members, with the distal ends of the two shoulder support members connected to each other and provides support to the lower outer region of the backpack body.

26. The backpack in claim 25 additionally comprising a plurality of rings connected to the body of the backpack and having one of said shoulder support members threaded through each ring.

ATTACHMENT 3

US006164509A

United States Patent [19]

Gausling et al.

[11] Patent Number: 6,164,509

[45] Date of Patent: Dec. 26, 2000

[54] **ERGONOMIC BOOKPACK**

[75] Inventors: **James F. Gausling; Stacey L. Moran,** both of Hermosa Beach, Calif.

[73] Assignee: **Zero g Technologies, LLC,** Incline Village, Nev.

[21] Appl. No.: **09/357,522**

[22] Filed: **Jul. 19, 1999**

[51] **Int. Cl.**[7] **A45F 3/04**

[52] **U.S. Cl.** **224/627**; 224/153; 224/259; 224/631; 224/645

[58] **Field of Search** 224/630, 259, 224/627, 631, 645, 153

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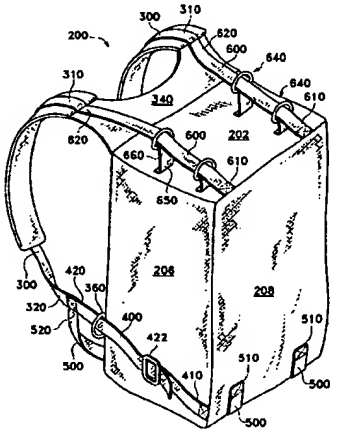
Primary Examiner—Stephen F. Gerrity
Assistant Examiner—Rhonda E. Sands
Attorney, Agent, or Firm—Morrison & Foerster LLP

[57] **ABSTRACT**

An ergonomic bookpack having an automatic suspension system is disclosed. A series of top straps, side straps, bottom straps and optional support members serve to move the bookpack center of gravity higher in the bookpack and closer to the wearer's body, significantly redistributing the load borne by the wearer's shoulders along a longer portion of the body and back. The body of the bookpack can be made so that the interior compartment of the bookpack body is transparent and the contents of the bookpack are visible to the human eye. The invention also comprises an optional yoke and lumbar pad. This bookpack of allows the wearer to bear heavier loads for a longer period of time with less fatigue, thus reducing the possibility of debilitating musculoskeletal difficulties.

20 Claims, 12 Drawing Sheets



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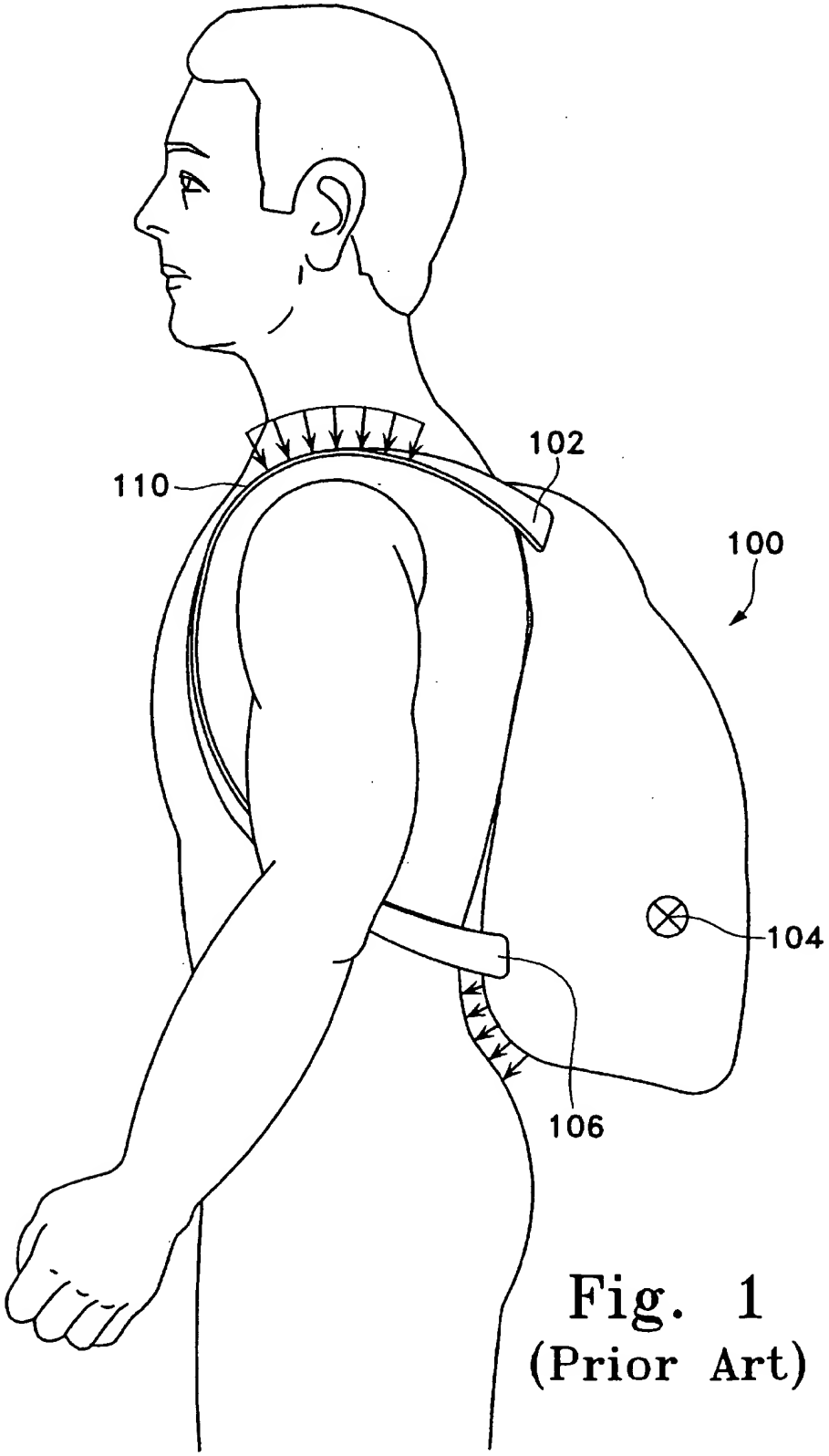

Fig. 1
(Prior Art)

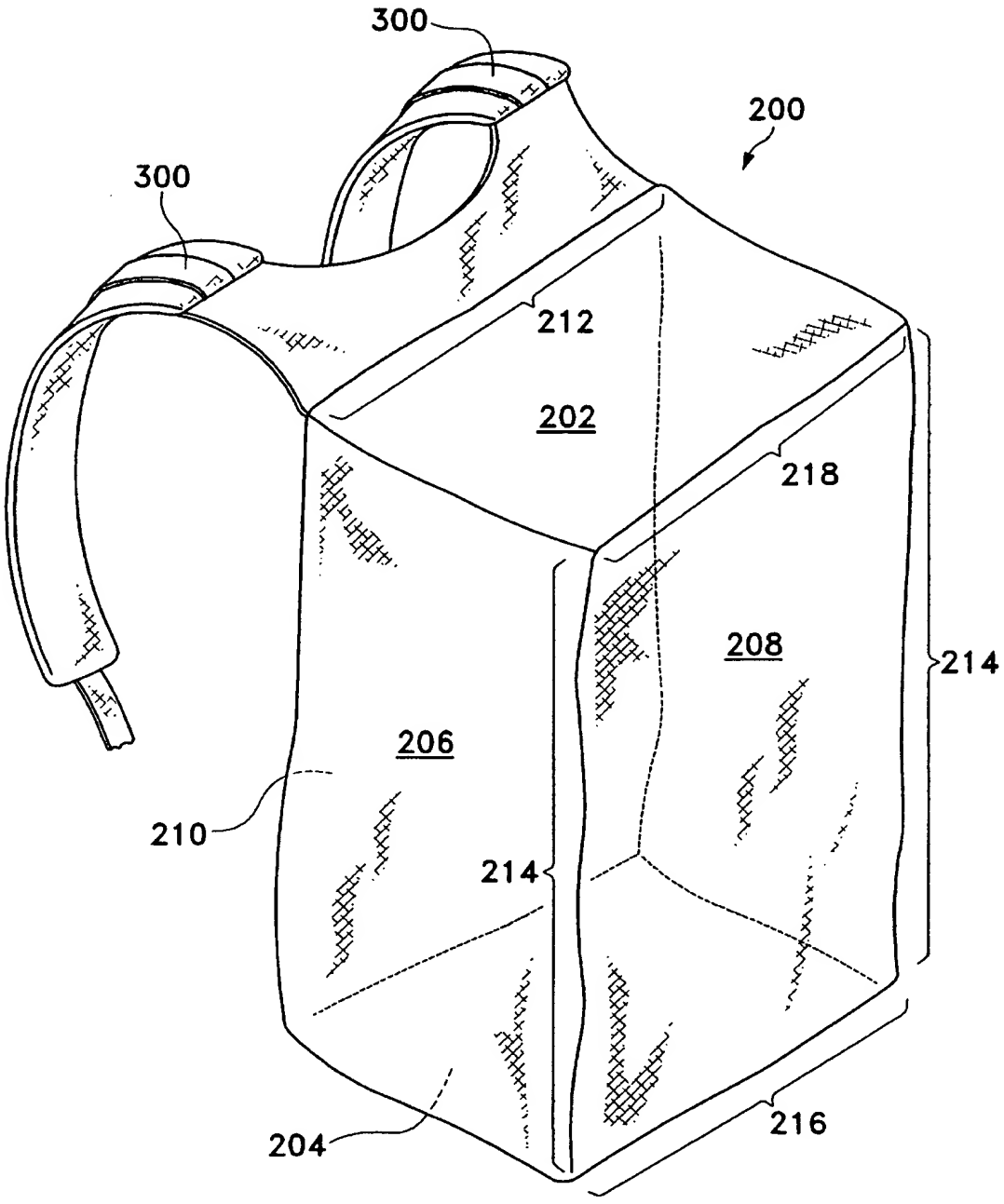

Fig. 2

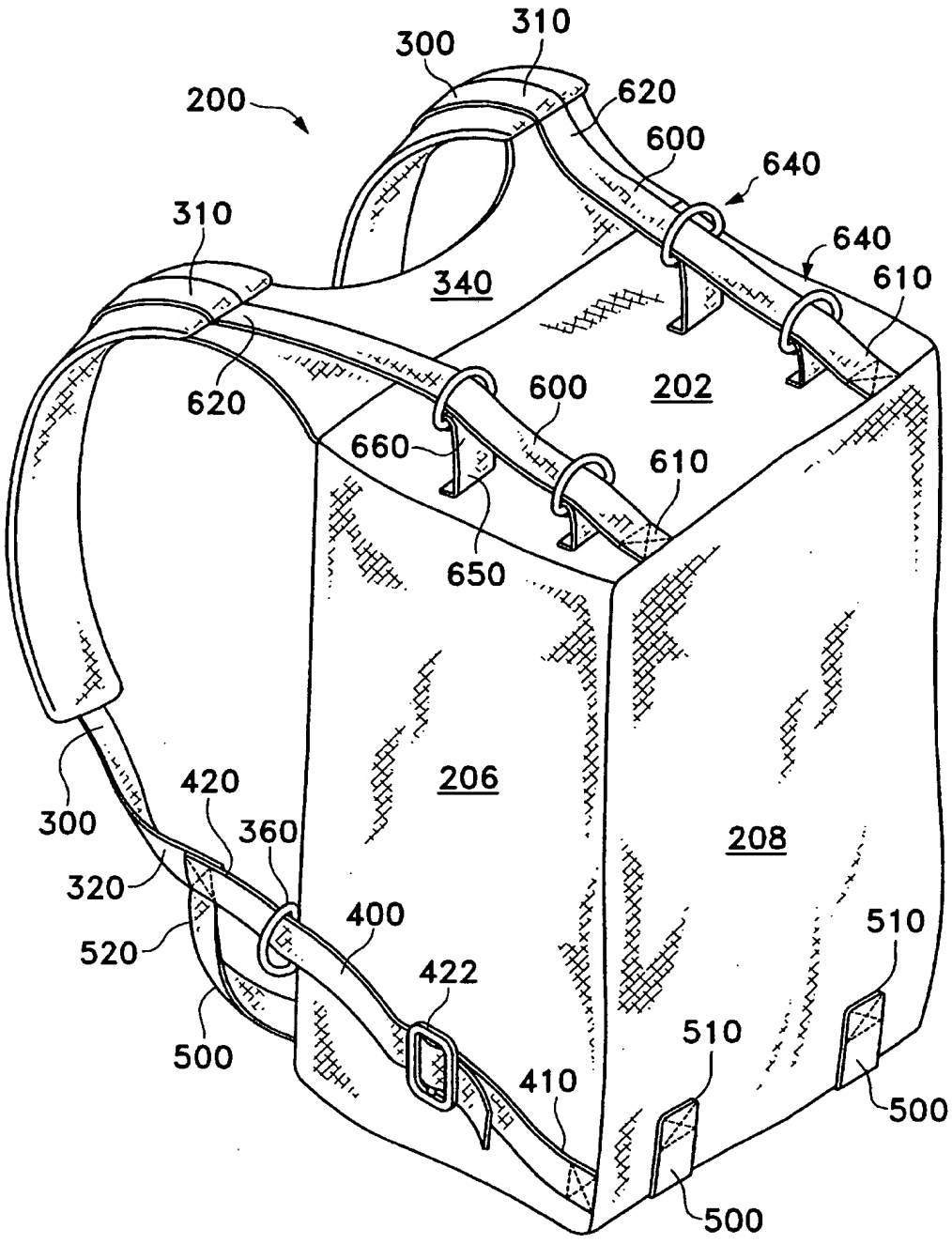
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Fig. 3

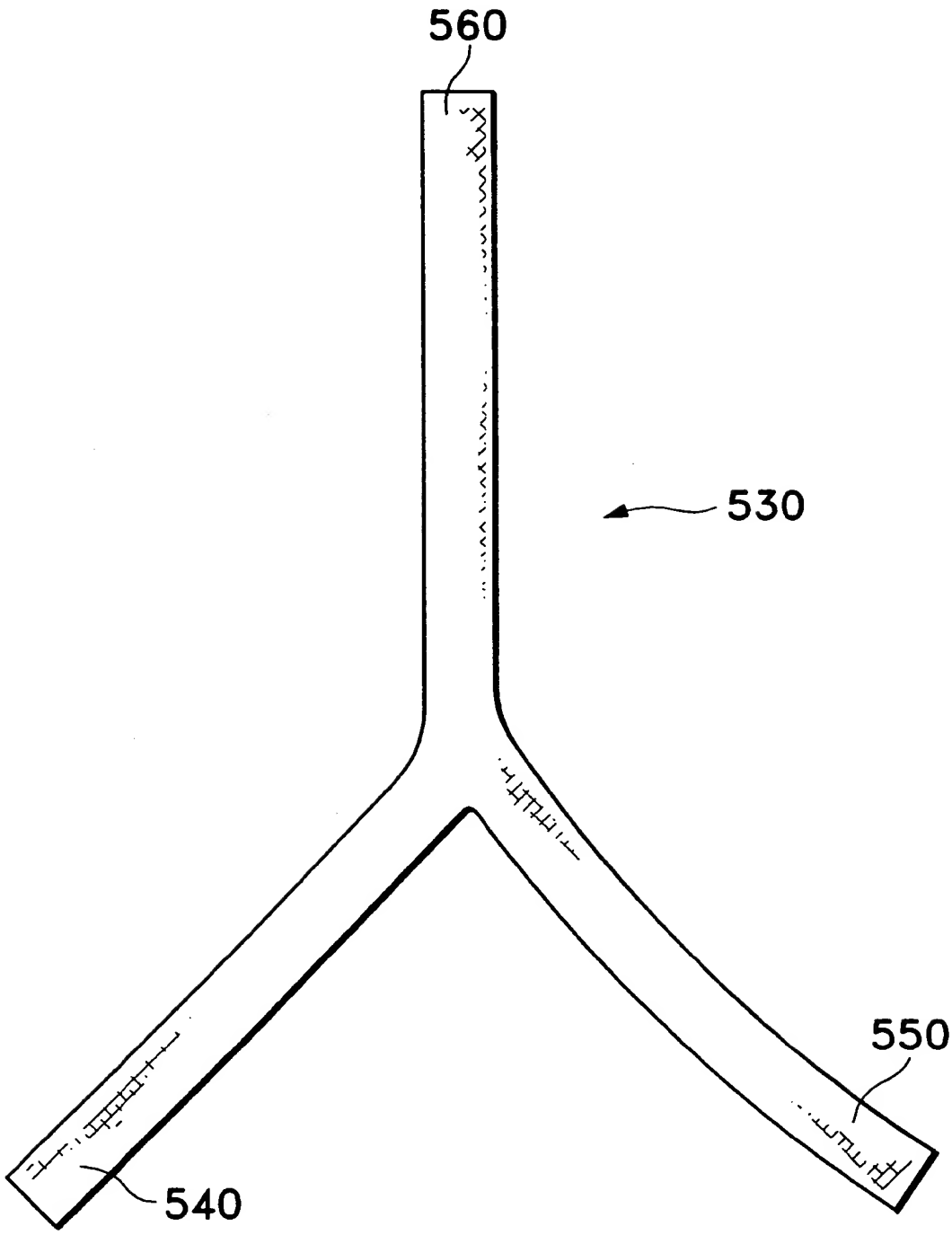

Fig. 3A

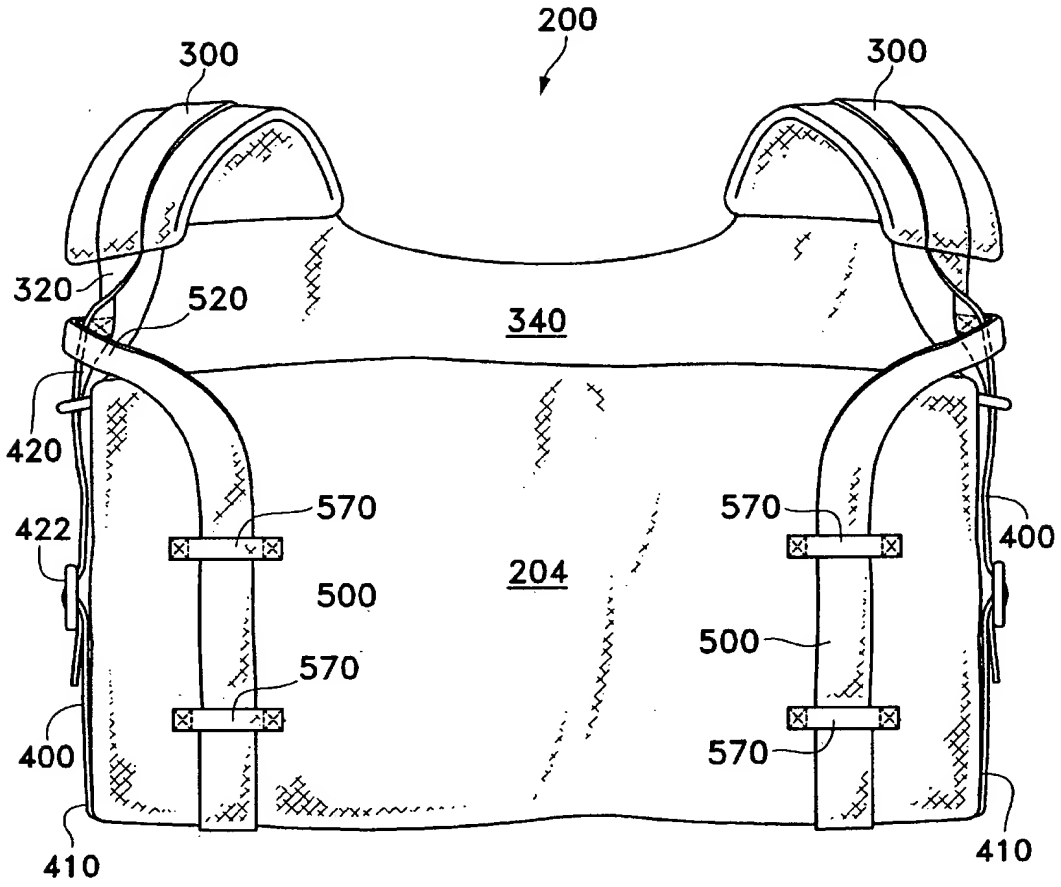
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Fig. 4

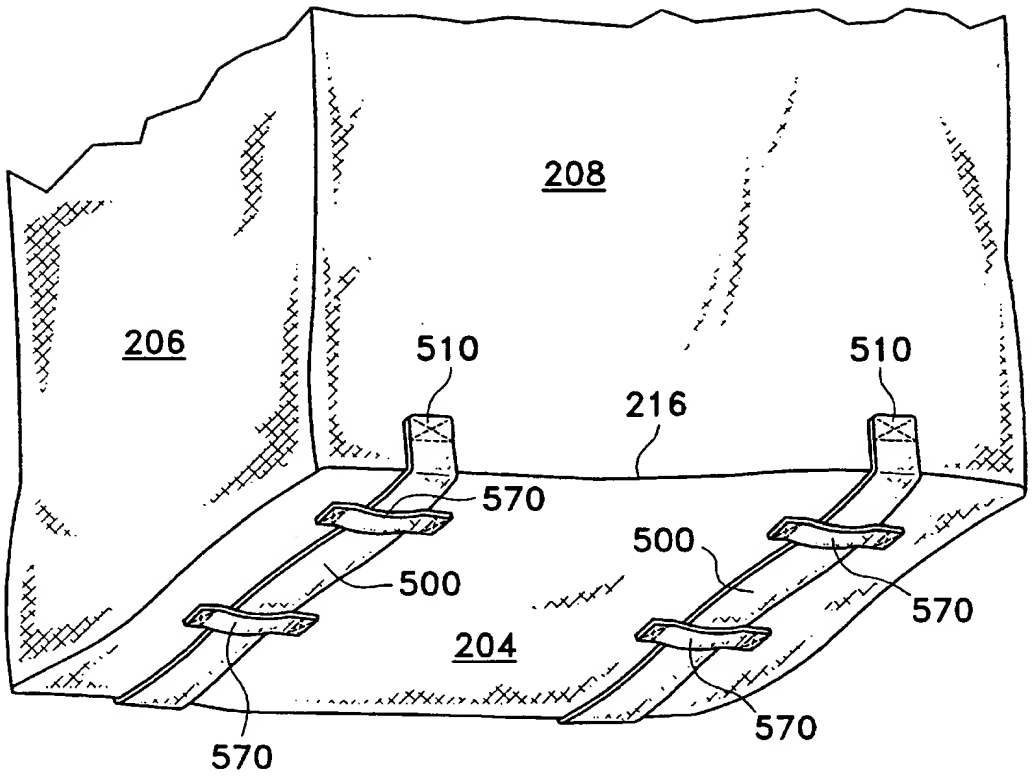

Fig. 4A

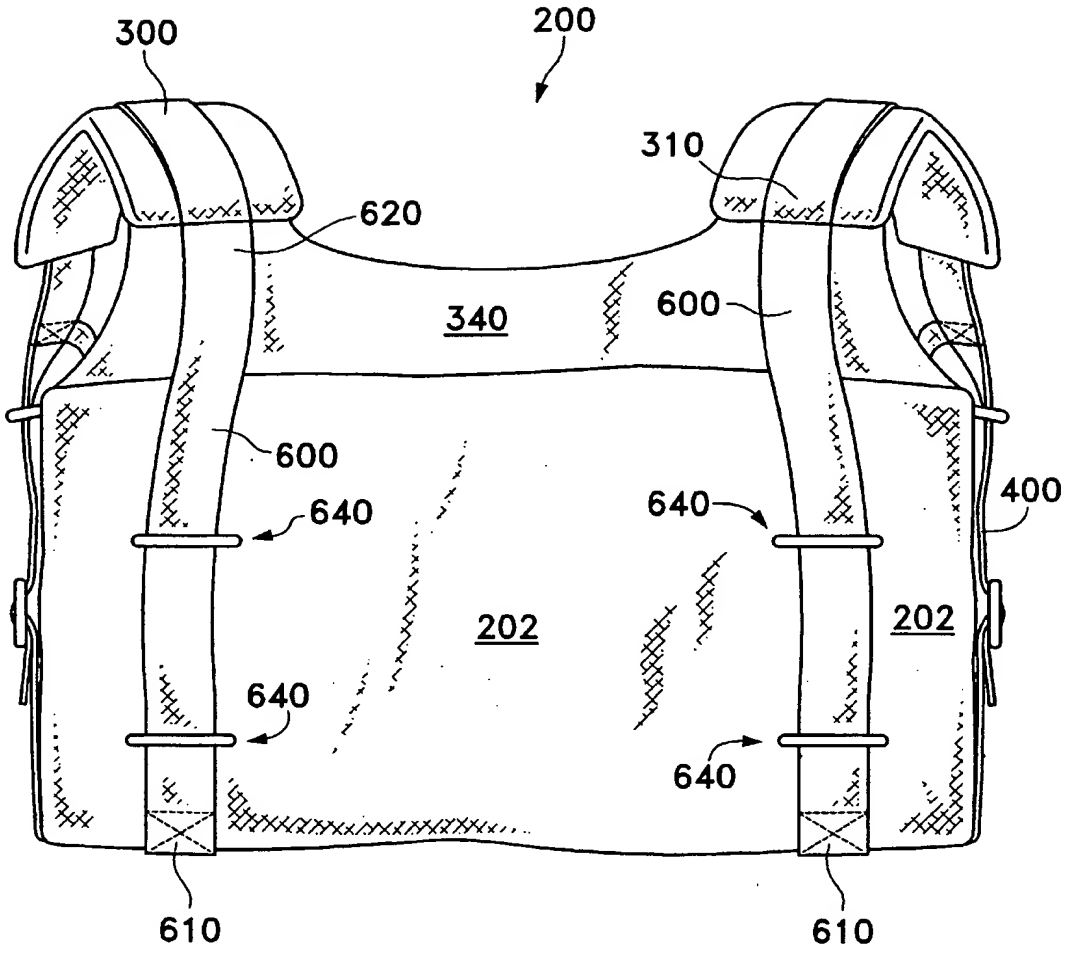

Fig. 5

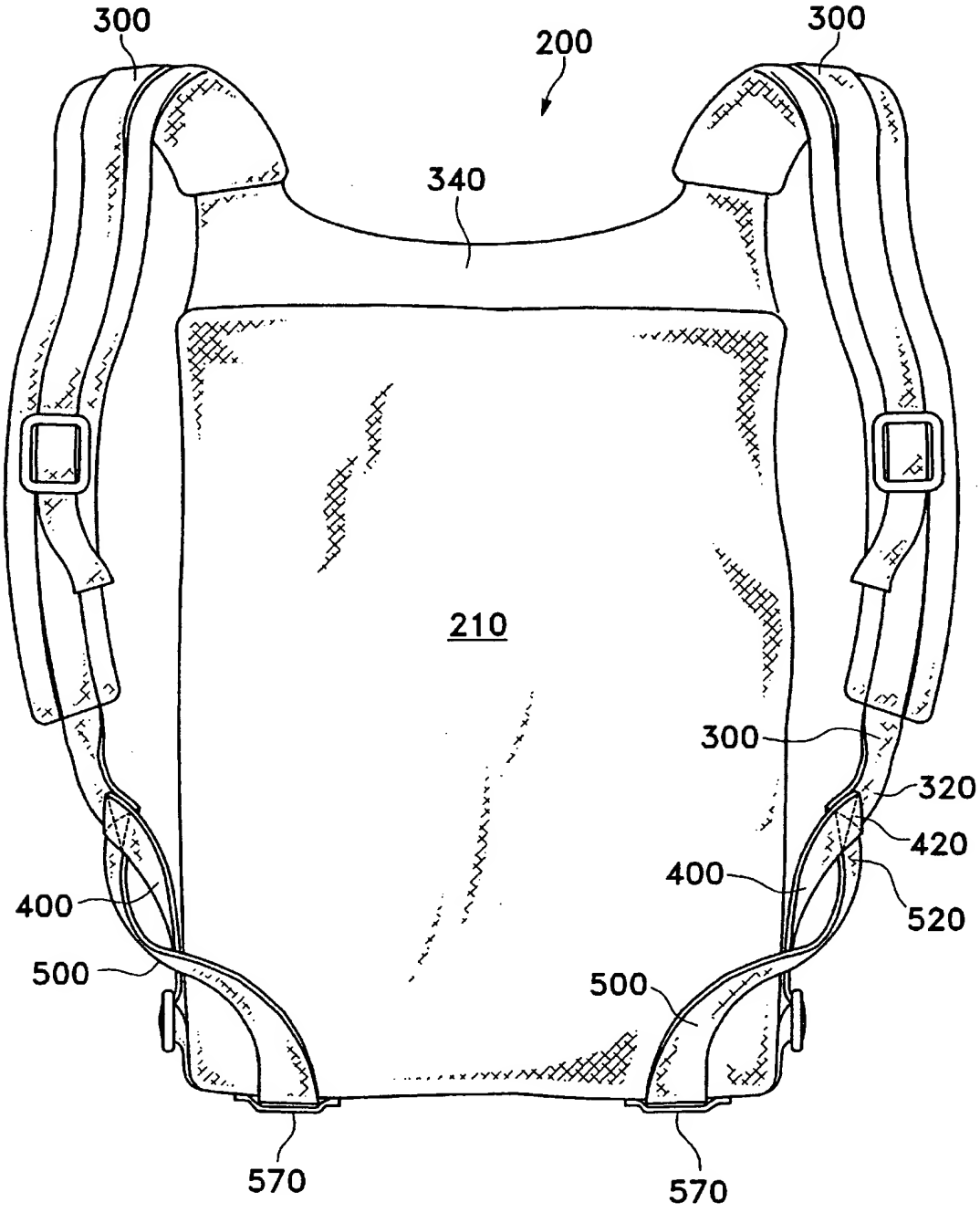

Fig. 6

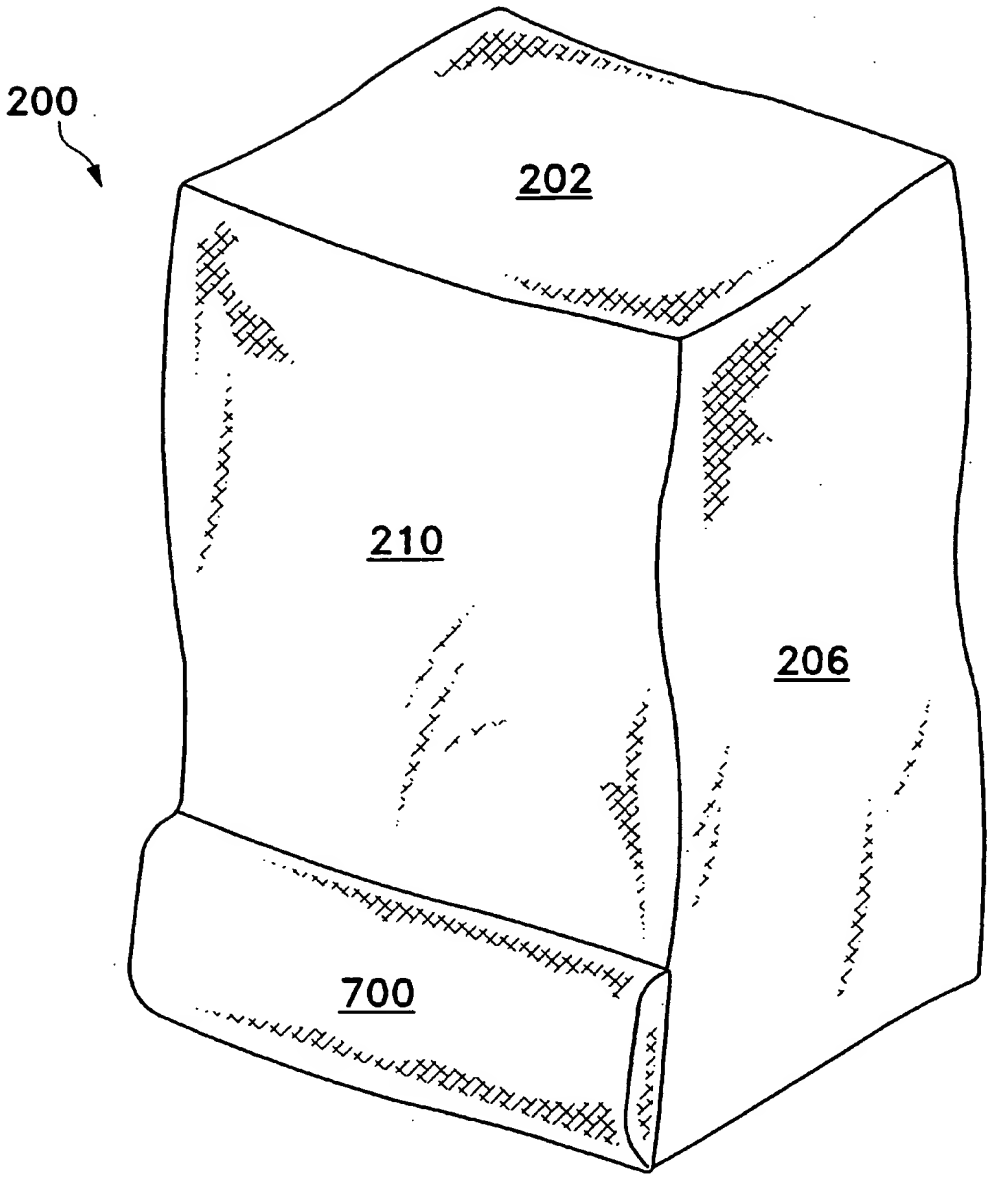

Fig. 6A

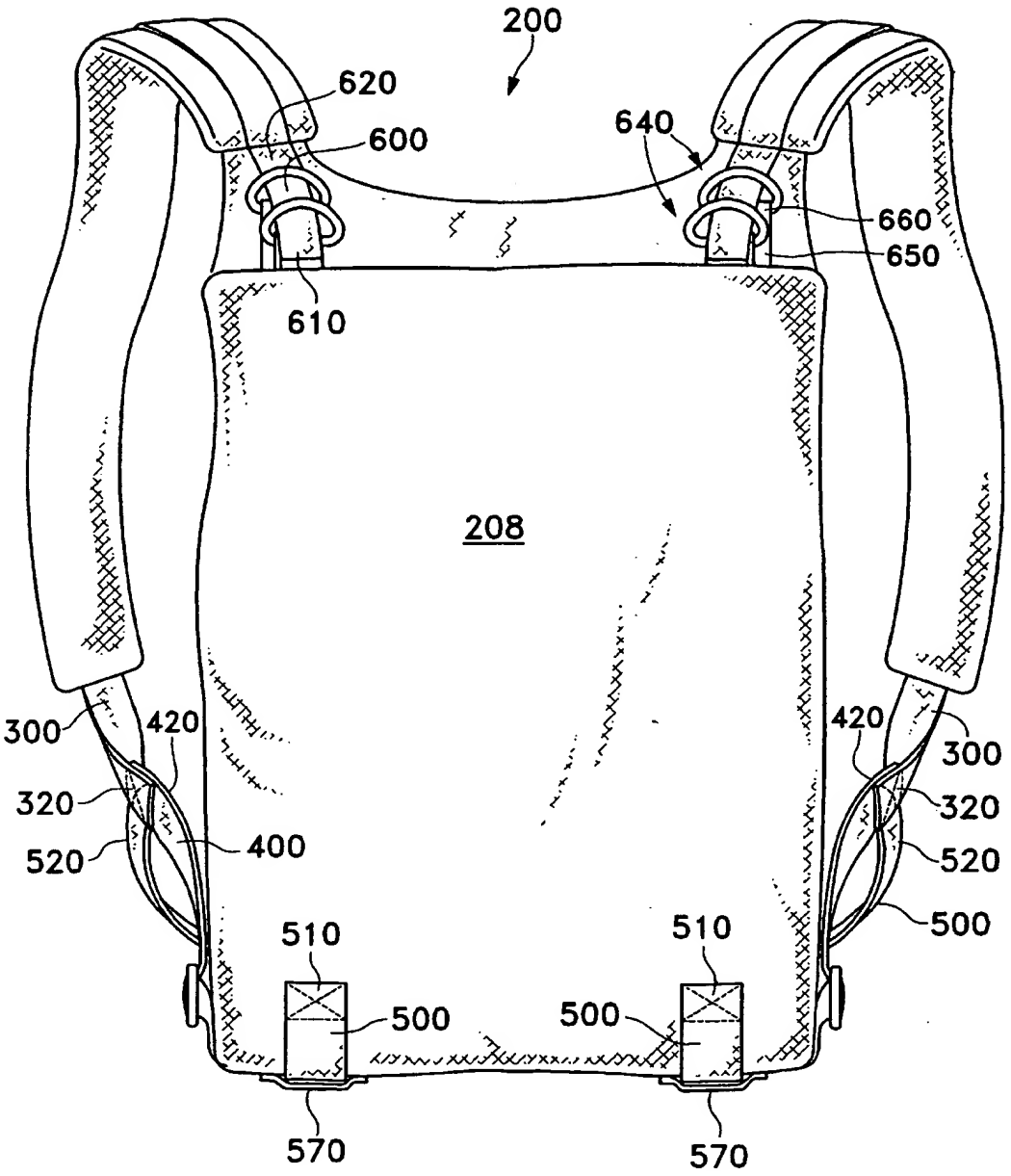
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Fig. 7

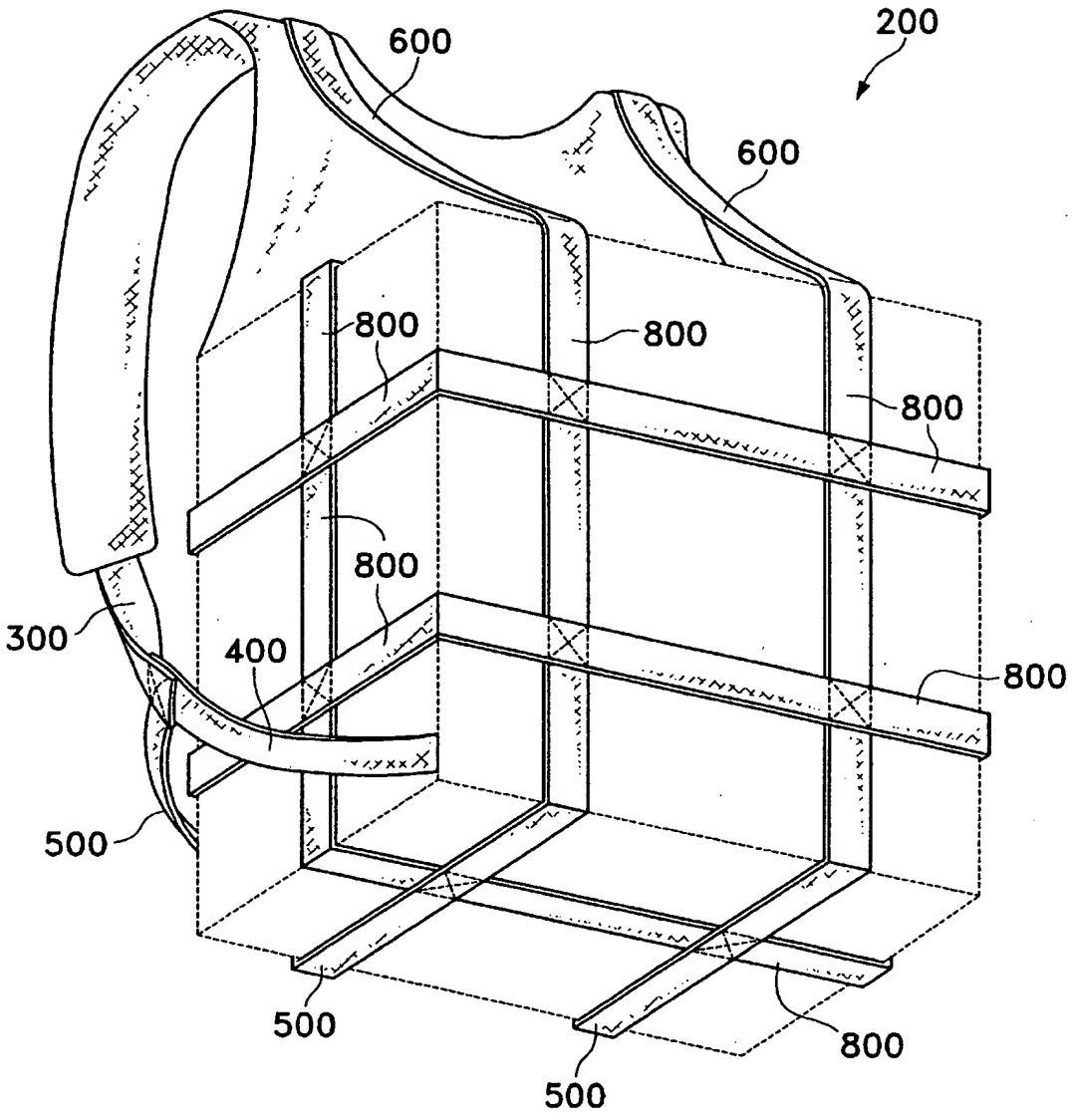

Fig. 8

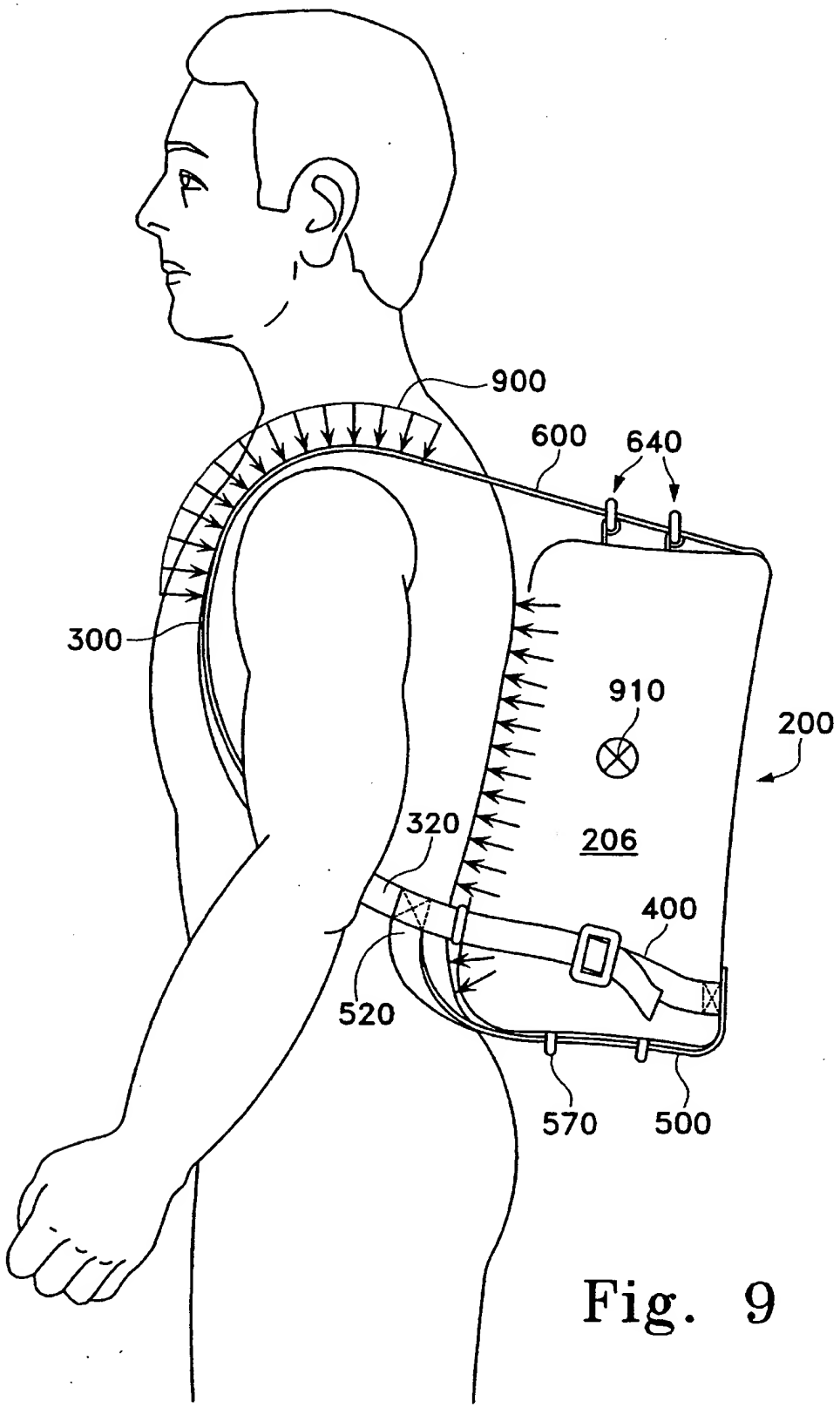

Fig. 9

ERGONOMIC BOOKPACK

TECHNICAL FIELD

This invention is related to backpacks for day use. In particular, this invention is an ergonomically designed backpack in which the stresses presented to the wearer are minimized, allowing the wearer to carry heavier loads for a longer period of time with the least possible fatigue or discomfort.

BACKGROUND

The popularity of backpacks for day use has increased substantially in recent years. Not only are they widely used for day hiking, bicycling, and climbing, but these day packs are most prevalent among students for carrying books and supplies between their homes and school.

As national emphasis continues to be placed on improving schools and the quality of education afforded young people, many educational institutions are extending the length of the school day. Students are accordingly expected to be prepared for these longer days by carrying more books and supplies than they have in the past. Moreover, many school districts are extending the length of the school year; thus, students are not only carrying heavier loads but are doing so with increasing regularity.

Along with the heavier loads being carried more frequently by these frameless packs comes the increased potential for fatigue, discomfort, poor posture, and even musculoskeletal disorder and injury. This places a premium on backpack design to minimize such potential. However, the suspension systems in many such backpacks are simply incapable of providing an ergonomically correct fit.

What is needed is a day pack with a suspension system designed to maximizing wearer comfort and health, even when the pack is fully loaded.

SUMMARY OF THE INVENTION

This invention involves ergonomic improvements to backpacks or bookpacks worn by individuals for carrying cargo. According to one aspect of the invention, the ergonomic backpack comprises a backpack body having a top side, a bottom side, two lateral sides, a body side, and an outer side. The backpack also has at least two shoulder support members, each with a proximal end and a distal end. The proximal end is connected to the backpack body at a first juncture between the top side and the body side. The backpack also has at least one side support member disposed adjacent one of the lateral sides. This side support member has a proximal end connected to the backpack body at a second juncture between the outer side and one of the lateral sides, and a distal end connected to one of the shoulder support members.

One or more of the various sides may be at least partially transparent (via a mesh material or by comprising one or more straps).

The backpack may also have a bottom member with a proximal end connected to the backpack body at a third juncture between the backpack body outer side and bottom side, and two distal ends, each of which is connected to the distal end of each shoulder support member. Two such bottom members, each with a single distal end, may also be included instead of a single bottom member. At least one bottom support member connected to the backpack body bottom side at a proximal end and one of the bottom members at a distal end may also be included.

Likewise, the backpack may also have a top member with a proximal end that is connected to the backpack body at a fourth juncture between the backpack body top side and the outer side, and two distal ends, each of which is connected to one of each of the shoulder support members. Two such top members, each with a single distal end, may also be included instead of a single top member. A top support member connected to the backpack body top side at a proximal end and one of the top member at a distal end may also be included.

A lumbar support member may be disposed adjacent the body side of the backpack body. In addition, a yoke may be disposed along the backpack body at the first juncture and connected to each shoulder strap.

According to another aspect of the invention, an ergonomic bookpack is provided comprising a backpack body having a top side, a bottom side, two lateral sides, a body side, and an outer side. At least two shoulder support members are also provided, each with a proximal end and a distal end. The proximal end is connected to the backpack body at a first juncture between the top side and the body side. The backpack also has at least one side support member disposed adjacent one of the lateral sides. This side support member has a proximal end connected to the backpack body at a second juncture between the outer side and one of the lateral sides and a distal end connected to one of the shoulder support members. The backpack also comprises at least one bottom member with a proximal end connected to the backpack body at a third juncture between the backpack body outer side and bottom side, and at least one distal end connected to the distal end of one of the shoulder support members.

One or more of the various sides can be at least partially transparent. In addition, the bottom side may have a higher stiffness than the top side, the two lateral sides, the body side, and the outer side.

According to yet another aspect of the invention, an ergonomic backpack is provided comprising a backpack body having an interior compartment, a top side, a bottom side, two lateral sides, a body side, and an outer side. The backpack also has a pair of shoulder straps, each with a distal end and a proximal end. The proximal end is connected to the backpack body at a first juncture between the top side and the body side. The backpack also includes a pair of side straps, each of which is disposed adjacent one of the lateral sides. Each side strap has a proximal end connected to the backpack body at a second juncture between one of the lateral sides and the outer side, and a distal end connected to one of the shoulder support members. The backpack includes a pair of bottom straps, each of which has a proximal end connected to the backpack body at a third juncture between the outer side and the bottom side and a distal end connected to each of the shoulder strap distal ends. Each bottom strap is at least partially disposed adjacent the bottom side. At least one bottom support strap having a proximal end connected to the bottom side of the backpack body and a distal end connected to one of the bottom straps is also included. A pair of top straps, each with a proximal end connected to the backpack body at a fourth juncture between the top side and the outer side and a distal end connected to each of the shoulder support straps is a part of this aspect of the invention. Finally, the backpack comprises at least one top support strap having a proximal end connected to the backpack body top side and a distal end connected to one of the top straps as well as a lumbar support member disposed adjacent the body side. When items are placed into the interior compartment, they may be visible to the human eye.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of a conventional bookpack shown as worn.

FIG. 2 is a simplified perspective view of the bookpack of the present invention detailing the bookpack body without the features of the automatic suspension system.

FIG. 3 is an perspective view of the bookpack of the present invention detailing the features of the automatic suspension system.

FIG. 3A is an alternative configuration for a bottom strap.

FIG. 4 is a bottom view of the bookpack of the present invention.

FIG. 4A is a perspective view of the bottom portion of the bookpack of the present invention.

FIG. 5 is a top view of the bookpack of the present invention.

FIG. 6 is a body side elevation of the bookpack of the present invention.

FIG. 6A is a simplified perspective view of the bookpack of the present invention with a lumbar pad.

FIG. 7 is an outer side elevation of the bookpack of the present invention.

FIG. 8 is a perspective view of a transparent body version of the bookpack of the present invention.

FIG. 9 is a side elevation of the bookpack of the present invention when worn.

DESCRIPTION OF THE INVENTION

Turning now to the figures, where like references refer to like elements, a model wearing a conventional bookpack is shown in FIG. 1 in side view. For purposes of illustration, pack body **100** is assumed to be moderately loaded with cargo, such as books, school supplies, and the like.

Backpack body **100** is connected to a pair of shoulder straps **110**, each of which is affixed to body **100**. In FIG. 1, one such strap **110** is shown attached to body **100** at point **102**.

The bookpack's center of gravity (CG), illustratively located in FIG. 1 at a position marked by reference numeral **104**, tends to be far behind the wearer's back and low in the backpack body. Such a position is manifested by the sagging appearance of the backpack body **100**.

The moment produced by the weight of the bookpack **100** with this support configuration is in a direction such that a force is produced toward the body at position **106** and a force away from the wearer's body at point **102**.

This configuration creates the large limited load distribution depicted in FIG. 1 over a relatively small portion of the wearer's body where the shoulder strap **110** meets the wearer's shoulder. It also causes point **106** to act as a sort of hinge or pivot point, causing the backpack body **100** to impinge on the wearer's back as shown near point **106**. Nearly all of the forces and moments caused by the bookpack weight are reacted at point **102**, through the top portion of strap **110**. As illustrated in FIG. 1, these forces pull the pack **100** out at the top and away from the wearer's body causing the shoulders to be pulled back. The weight is distributed across a disproportionately small section of the shoulder straps directly on top of the wearer's shoulders. It also forces the shoulder straps under the arm to ride up and pinch under the wearer's arms.

Anyone who has seen a student walking across campus with a full bookpack, hunched over and with their thumbs holding the shoulder straps out off their chests has witnessed this effect. Such a configuration causes unnecessary fatigue, discomfort, and the possibility of long-term musculoskeletal difficulties.

In contrast, the bookpack of the present invention remedies the problems caused by typical bookpacks such as that shown in FIG. 1. One embodiment of the present invention is shown in FIGS. 2–7 and 9.

A simplified backpack body **200** of the present invention is formed by a number of panels or sides as shown in FIG. 2 without a number of the inventive features so that the underlying components and numbering conventions can be first described.

Bookpack body **200** has a top side or region **202**, a bottom side or region **204**, two lateral sides or regions **206**, an outer side or region **208**, and a body side or region **210**. When connected, these six panel regions define an interior compartment in body **200** into which cargo such as books, food, clothing, etc. may be stowed. Of course, this region may be subdivided into or complemented with a number of additional compartments or regions for keeping various items separate (facilitating organization, ease of ready access to frequently used items such as keys or water bottles, and allowing for the proper weight distribution and comfort to the wearer).

The particular six-panel configuration herein described serves two primary purposes. First, it provides a convention by which the features of the invention can be described and the relationships among the various components can be shown. Second, it is a simple and graphic way to depict the general shape of bookpack body **200** when loaded with cargo, and corresponds to the principal views any generic cubic or rectangular three-dimensional body presents to an observer (top, bottom, and four sides).

Although six particular sides or panels are described, bookpack body **200** can comprise fewer panels or sides, and have correspondingly fewer seams or junctures, and be within the scope of the invention. For instance, in an extreme example, a configuration in which each of the body, top, bottom, outer, and lateral sides are comprised of one continuous piece of fabric with no actual seams or junctures is within the scope of the present invention. In such a case, one may still describe the body **200** as having a number of seams or junctures simply to aid the reader in understanding the relative location on the body **200** being discussed. On the other hand, and at the other end of the spectrum, a configuration in which as many as ten or more panels or sides and corresponding seams or junctures is contemplated as well.

Separating the various panels or side regions described above are a series of junctures or seams. For instance, a first juncture **212** is defined between top panel **202** and body side **210**. Second seams or junctures **214** are similarly disposed along lines or region between the outer side **208** and the two lateral sides **206**. A third juncture or seam **216** defines a transition region between the bottom panel **204** and the outer side **208**, and a fourth juncture or seam **218** is disposed generally between the outer side **208** and the top panel or side **202**.

These various seams or junctures are described herein strictly to assist the reader in understanding the construction of the various embodiments of the invention and the locations of various attachment points for components thereof.

In addition, the description of the various junctures is meant to define a region as opposed to a specific location on body **200**. Therefore, when for example a first juncture **212** between top side **202** and body side **210** is described, it is

expressly meant only to define a general region of transition between these two sides **202** and **210**. This means that one may move as many as several inches away from the first juncture **212** into the region of the top side **202** or body side **210**, or anywhere along the line shown in the figures as defining these junctures, and still be within the scope of what we intend the meaning of the term "seam" or "juncture" to cover. Accordingly, when the various support members and straps of the present invention are discussed as connected to the backpack at or disposed along the various junctures, it is understood that the point of connection or disposal is in a region at or near the particular juncture or seam; the connection point need not be exactly on that juncture or seam.

With this in mind, junctures or seams can comprise a general transition region in backpack body from one section to another without any discontinuity in the panel or side. For instance, first juncture **212** between the top side **202** and the body side **210** can generally define a region where, when body **200** is loaded with contents, the panels or sides transition from one orientation to another; in other words, the first juncture **212** is merely a bend in the backpack body **200**.

Alternatively, continuing to use the first juncture **212** example, seam **212** can be permanent, such as a line of sewing or other type of permanent bonding or fusing of the two sides, or it can be a temporary seam along or near which a body compartment can be opened and closed. In the latter case, first juncture or seam **212** can represent an area near a Nylon or metal zipper, a hook and loop-type fastener, snaps, buttons, and the like. These options described above for juncture **212** applies, of course, to all the junctures herein described.

The discussion and designation of the various components of body **200** shown in FIG. **2**, including the panels or sides and their corresponding seams as described below, are simplified so that the advantages of the present invention can be particularly described. For instance, it is within the scope of the invention that although body **200** defines a compartment into which cargo such as books, clothing, food, etc. may be placed, additional compartments and features such as outer and side compartments, loops, daisy chains, etc. may be added to the backpack body **200**.

The panels making up backpack body **200**, as well as the straps and other components of the invention can variously comprise a number of natural or synthetic materials. Natural fabric such as leather, cotton (especially canvas or single-filled duck) and the like may be useful for certain applications. Preferred are synthetic fabrics made from thermoplastic materials such as polypropylene, polyvinyl, polyamide (such as Nylon), polyethylene, polyester, etc. We have found 0.005 inch-thick polypropylene fabric to be useful. Especially preferred is Nylon which can be textured for breathability, wear-resistance, and waterproofed with materials such as silicone elastomers and the like. Particularly useful is a type of Nylon known as CORDURA (E.I. du Pont de Nemours & Co., Wilmington, Del.). Multiple or composite layer configurations as are well-known in the art, in which a tougher, more durable weave comprises an outer layer while a lighter, thinner, and more flexible inner weave comprises an inner layer. Some of these materials known in the industry, such as GORE-TEX (W.L. Gore & Associates, Newark, Del.), TRI-SHFIELD (Tri-Seal International, Blauvelt, N.Y.), SPANDURA (H. Warsaw & Sons, New York, N.Y.), etc. can be used as appropriate.

We have found that when using the above materials in fibrous form, finenesses in the range from 75 denier to 2000 denier are possible. Preferred are fibers in the range of 500 denier to 1050 denier; especially preferred is 1000 denier. Various thicknesses of fabric can be used as appropriate. In addition, for the different support members or straps variously described herein, widths of anywhere from 0.25 inch to over 3 inches or more are contemplated; preferred are 0.5 inch to 1.0 inch widths.

A pair of shoulder support members, or straps **300**, are shown in FIGS. **2–9**. Each strap **300** has a proximal end **310** and a distal end **320**. Support member proximal end **310** is connected to pack **200** at first juncture **212** via optional yoke **340**. Alternatively, proximal end **310** can directly connect to pack **200** at first juncture **212** without the presence of yoke **340**. In either configuration, each proximal end **310** of shoulder support member **300** is attached to first seam **212** by stitching, etc. as is well-known in the art. Shoulder support member **300** can be complemented with padding and adjustment straps (as more clearly shown in FIG. **6**), sternum straps connecting each shoulder strap **300** (not shown), etc., as necessary to ensure proper comfort and functionality of the overall design.

Turning now to lateral or side panels **206**, a side support member or strap **400** is shown in FIGS. **3–9** as disposed adjacent each side panel **206**.

Each side support member **400** has a proximal end **410** and a distal end **420**. As best shown in FIG. **3**, the side member proximal end **410** is affixed to body **200** at the second juncture or seam **214** appropriate for the side of the bookpack body **200** on which side strap **400** is disposed. Although we prefer that side strap **400** attach to body **200** close to the bottom of the body as shown in the figures, side support member **400** can be attached to body **200** up to several inches or more above the bottom of body **200** along the length of second seam or juncture **214**.

Side support member **400** is preferably disposed along lateral or side panels **206**. As will be discussed later, such a configuration allows the side strap **400** to redistribute the load borne by the wearer of the backpack more evenly across the wearer's back and along the shoulder straps **300**.

Side support member distal end **420** is shown in FIG. **3** as connected to the distal end **320** of shoulder support member **300**, permanently (e.g., by stitching as shown in FIG. **3**) or releasably (such as by a hook and loop type fastener, an adjustable buckle, or the like). The shoulder strap **300** and side strap **400** distal ends cam be connected so to form the appearance of a continuous strap.

Side support member **400** can be optionally threaded through a D-ring **360** as shown in FIG. **3**. By slidingly engaging strap **400**, D-ring **360** helps to keep side strap **400** close to side panel **206**, aligns the strap **400** for connection to the shoulder strap **300**, and provides stress relief by allowing side strap **400** to move in response to shifting loads.

An optional adjustable Nylon or metal buckle **422** or the like is shown in FIG. **3** intermediately disposed between side strap **400** proximal and distal ends. Technically, such a buckle or device may require side strap **400** to actually comprise two strap sections; it is understood that when discussing the proximal and distal end of side strap **400** (or any strap herein), any multiple strap pieces are considered together with any buckle or the like to form a unitary component having a single proximal end and a single distal end.

By allowing the effective length of side strap **400** to be lengthened or shortened, buckle **422** serves not only to directly adjust the load distribution borne by the wearer by

pulling in or letting out the shoulder strap **300** via its distal end **320**, but it also allows the side straps **400** to act as compression straps, adjusting the shape of the bookpack body **200** via compression or expansion of lateral or side panels **206**.

As long as the proximal end **410** of side strap **400** is connected to the body of bag **200** in the vicinity of second juncture **214**, or even some distance as far as two to three inches or more in any direction away from such seam **214**, various adjustment and fastening configurations and designs, such as described above and as are well known in the art, are within the scope of the invention.

Another feature of the present invention that provides added support and ergonomic utility to the backpack is a rigid pack body bottom side **204**. As will be seen, such a characteristic serves to keep the bookpack body **200** square, lifting and compressing the load towards the wearer's body and shoulders.

Although there are a variety of ways in which the bottom of pack body **200** can be made rigid, two are particularly attractive.

The first involves utilizing a stiffer material for bottom panel **204** than the material used for the rest of the backpack body **200**. By using the term stiffness with respect to bottom side **204**, we mean, singly or in combination, the elastic modulus in the three principal directions (tension, bending, and shear) as well as the overall rigidity of the bottom side **204** when considered by a layperson.

For instance, bottom panel **204** can comprise a thicker layer of Nylon, polyurethane, polyallomer, etc., increasing the bottom side's stiffness relative to the other five panels of body **200**. This can also be accomplished by fabricating the bottom panel **204** as a composite, such that various layers of material having dissimilar mechanical properties make up bottom panel **204**, or by inserting a rigid member (such as a hard Nylon sheet) inside a pocket formed by bottom panel **204**, etc.

For instance, a relatively thick layer of polyurethane or abrasion-resistant Nylon, ranging in thickness from a few millimeters to several centimeters or more, can be bonded or otherwise affixed to the outside of bottom panel **204**. This serves not only to increase the rigidity of the bottom panel **204**, but also serves to protect the bottom panel **204** from wear and abrasion as the backpack is most typically placed on the ground, etc. on the bottom panel **204**. Such a layer can be grooved or otherwise molded or shaped, etc. to facilitate non-skidding and to allow the backpack to be self-standing.

Another method for increasing the stiffness of the bottom panel **240**, useable singly or in combination with any of the features described above, is by adding one or more bottom straps or members **500**. FIGS. **3–4**, **4A**, and **6–9** show a configuration in which two such bottom straps **500** are used.

Here, a proximal end or region **510** of each bottom strap **500** is connected to the body **200** on or near a third juncture or seam **216** defined at the intersection of outer side **208** and bottom side **204**. Each bottom member **500** preferably is disposed adjacent bottom panel **204** and connects at its distal end **520** to the right or left shoulder strap distal end **320** or side strap distal end **420**, or both, in the general vicinity of their intersection as shown in FIG. **3**. Again, such connection points for both the proximal and distal ends of these bottom members **500** can be widely varied to serve the purposes which suit the particular design, and the invention is not so limited to the precise connection locations shown in the figures.

When a single bottom strap is used, one variation shown in FIG. **3A** is suitable. Here, instead of having a single distal end as described above, strap **530** forms a "Y" by dividing into two distal ends **540** and **550**, each of which connects to the distal end of right and left shoulder support members **300**. Proximal end **560** of such a strap ideally will affix to body **200** at or near the fourth seam **218**, approximately equidistant from each lateral panel **206**. This helps to equally distribute the loads carried by each distal end **540** and **550** through the shoulder straps **300** and ensure that the shape of the bottom side **204** is as flat and symmetric as possible. Such a design has the added advantage of being aesthetically pleasing.

If more than two bottom straps are used, we prefer that they be in multiples of two, although this is not necessary (an odd number of bottom straps can be used as well). An even number, such as four, allows for their symmetric disposal about the bottom panel **204** and correspondingly symmetric load distribution.

One or more optional bottom support members **570** can be used to maintain the alignment of the bottom straps **500** adjacent bottom panel **204**. Such a bottom support member can be removably or (preferably) permanently affixed to bottom panel **204** such as by sewing or the like.

A variation of these support members is shown in FIGS. **4** and **4A**. Here. four bottom support members **570**, each comprising a length of Nylon strapping or other material, are affixed at their ends, such as by stitching or the like, to bottom panel **204** so that they generally are aligned with third scam **216**. In this configuration, a gap is formed between each bottom support member **570** and the bottom panel **204**. Each bottom strap **500** is threaded through this gap, as shown in FIG. **4A**, and is thus kept within the confines of the support members **570**. Note that the ends of each support member **570** shown in FIG. **4A** can be moved together so that they overlap when affixed to bottom side **204**. This forms a type of loop through which bottom strap **500** can be threaded.

In an alternative design (not shown), one end of bottom support member **570** can be sewn into bottom panel **204** and a ring or loop of material such as metal, Nylon, polyester thread, etc. can be formed in or attached to the other end of member **570**. Bottom strap **500** can then be threaded through this ring or loop.

In addition to being a length of Nylon or other webbing or strapping material, bottom support member **570** can simply comprise multiple or solitary D-rings, clips, two-piece configurations with straps having adjustable buckles or clasps, etc. Such alternative configurations can be tailored to facilitate adjustability, flexibility, and strain relief as dictated by the design of the backpack and its particular performance requirements.

As shown in FIGS. **4** and **4A**, we prefer that at least two bottom support members **570** be used for each bottom strap **500**. However, less or more may be used depending upon the load designation, the number of bottom straps, aesthetic considerations, etc.

An additional optional feature of the invention is one or more top straps or members **600**. FIGS. **3** and **7–9** show a configuration in which two such top straps are used.

Here, a proximal end or region **610** of each top strap **600** connects to the backpack body on or near a fourth juncture or seam **218** defined at the intersection of the outer side **208** and top side **204**. Each top member **600** runs along the top panel and connects at its distal end **620** to the right or left shoulder support member **300** at a point distal to where shoulder strap **300** attaches to backpack body **200**. For instance, in FIG. **3**, top strap **600** attaches to shoulder strap

300 several inches from body 200. Top strap 600 may also attach to optional yoke 340. Generally, however, we prefer that the distal end 620 of top strap 600 attach to the shoulder support member 300 at a point approximating the uppermost portion of the wearer's shoulder when the backpack is fitted on a wearer. As will be described in detail below, this attachment point provides the most efficient and direct load transfer and helps to maintain an ideal square shape to the top of bookpack body 200.

Again, such connection points for both the proximal and distal ends of these top members 600 can be widely varied to serve the purposes which suit the particular design, and the invention is not so limited to the precise connection locations shown in the figures.

As discussed with respect to the bottom straps, a variety of configurations and numbers of top straps can be used in the present invention. For instance, a top strap having a "Y" configuration can be used, where each of two distal ends connects to each of the shoulder straps 300. In the case where more than one or two top straps is used, we prefer that the number of straps be even so to facilitate balanced load transfer and symmetry.

To assist in maintaining the square shape of the top of the bookpack body 200 and to keep the body 200 in towards the wearer's shoulders and relatively high, one or more optional minor straps or top support members 640 can be used in conjunction with top straps 600.

Such support members can have the variety of configurations and forms as described above with respect to bottom support members 840. Note a desirable configuration shown in FIGS. 3 and 7–8. In this embodiment, top support members 640 each has a proximal end 650 connected to top side 202 and a distal end 660 which is slidingly or permanently connected to the top strap 600 via an attached D-ring or similar loop.

Alternatively, a loop for the top strap 600 can be formed from the top support member material at its distal end 660, for instance by sewing the distal end over and onto itself. Of course, for this variation, the top support member 640 will be affixed to top side 202 so that the loop is oriented for receiving top strap 600; i.e., generally perpendicular to the arrangement of FIG. 3.

These and other top support member 640 arrangements, all of which are within the scope of the invention, help support the load borne by the wearer and assist the top straps in keeping the body 200 square at the top and keeping the bookpack high relative to the wearer's shoulders. Due to the downward force acting on the top support members 640, these members are placed under stress as they assist in bearing the load of body 200 at their distal end 648 where they engage top straps 600. It is therefore important that the point of connection between the distal end 660 of top support member 640 and top strap 600 be designed for durability and load-bearing functionality. This can be accomplished by reinforcing the top support member distal end 640 (by, e.g. affixing additional material), etc. In addition, a low-friction abrasion-resistant coating can be placed on either or both the distal end 640 and top strap 600 where they directly interface to prevent binding and to protect the materials from abrasion damage.

FIG. 6A shows an embodiment where bookpack body 200 has an optional lumbar support member 700, which can take the form of padding or cushioning, such as polyurethane foam and the like (other features of the invention have been removed in FIG. 6A for clarity). Any type of padding or other support as is well-known in the art is appropriate.

For instance, lumbar support member 700 can be permanently (such as by sewing) or removably (such as by snaps, zipper, hook and loop fasteners. etc.) affixed to the body panel 210 so that it is disposed directly adjacent the wearer's lumbar region when worn.

In an alternative arrangement, a compartment or pouch affixed to or integrally formed as part of the panel forming the body side 210. A lumbar support member is formed when a pad or cargo serving as padding material (such as a towel) is inserted into this compartment prior to wearing the backpack. In this manner, the lumbar support member is an optional feature that can be selectively created and tailored by the wearer. When such a pad is no longer needed, the contents of the sleeve can be removed and the body 200 of the bookpack operates as if no lumbar pad existed.

Although it is not shown in the figures, this invention may also include a waist or hip belt attached to lumbar pad 700, backpack body 200, or even side straps 400 or bottom straps 500, singly or in combination as needed. Such a waist belt provides added support and helps transfer the load caused by the contents to the pelvic region of the wearer. Especially useful is a configuration where the waist belt is connected at its distal and proximal ends to the lower end of bookpack body 200 in the vicinity of the intersection of side panel 204 and body panel 206. It is also useful for the hip belt to be comprised of two pieces, one end of each connected to the bookpack body 200 as described, and the other ends of each strap connectable to one another by a conventional plastic or metal clasp or buckle, hook and loop-type fasteners, etc. as are well-known in the art. This hip belt can be adjustable for a proper fit.

There may be instances where it is desirable to be able to view the contents of the bookpack body 200 without having to open compartments and inspect the body interior. For instance, it may be that the owner of the bookpack is a child student and the parent wishes to be able to see what the child is carrying to school. Concerns about security by school, airport, or stadium officials may be satisfied with such a bookpack as its contents are readily inspectable. In some cases, such as schools, such a feature may be mandatory given heightened security measures in the wake of the well-publicized and tragic instances of school violence.

FIG. 8 depicts an embodiment of the invention containing this "see-through" feature. Here, the top, bottom, lateral, outer, and body side panels as shown in the previous figures have been replaced with strapping 800 to form the body 200 of the backpack. Such strapping 800 is strong enough and wide enough to provide the carrying capability and durability required of the bookpack, yet afford enough space between straps so to allow one to readily view (and access) the contents of the backpack without opening a compartment.

Note that the outlined margins of the backpack are depicted in FIG. 8 to represent approximate boundaries of the backpack, and not a physical portion of the body 200 itself. Note also that the various components of the automatic suspension system, such as shoulder straps 300, top straps 600, bottom straps 500, and side straps 400 are still present, thus affording the wearer the same advantages of the ergonomic backpack but with a see-through body 200.

As previously discussed, straps 800 comprising the backpack body 200 can be made of the same material used for the body panels or the other straps; alternatively, they may be reinforced via high-performance fibers and the like to enhance their load-carrying capacity. Straps 800 depicted in FIG. 8 can take on a variety of thicknesses, widths, material

forms, attachment methods, patterns (such as the linear crossing pattern shown in FIG. **8**), strap spacing, alignment, etc. As long as the straps securely hold and protect the bookpack contents in the interior compartment while allowing one to view those contents from the outside, any strapping configuration is appropriate. One advantage of this configuration is the ability to place and access a relatively small bag or piece of luggage; e.g., airline carry-on luggage, inside the compartment formed by straps **800** such that the luggage handles or straps may be accessible through a gap or gaps in straps **800**. This provides a convenient way for the wearer to carry the luggage on their back while still being able to conventionally carry the luggage by its own handle while the luggage is still inside the backpack compartment.

In addition, straps **800** can be replaced with a webbing or mesh material that allows light to penetrate through so that the contents of the body **200** are visible to the human eye without undue straining or inspection.

Instead of replacing the various panels as shown in FIG. **2** with the strapping **800** as shown in FIG. **8**, the panels can also be comprised, partially or completely, of a continuous but transparent or translucent thermoplastic film or layer such as acrylic, cellulose, fluoroplastic, phenoxy, ionomer, rapidly-cooled polyamides such as Nylon 6 and Nylon 6, 6, polycarbonate, the polyolefins such as polyethylene, polystyrene, or other material that allows objects or contents of the body **200** to be visible from the outside.

Note that to allow the contents of the bookpack body **200** to be visible to the human eye, it is not necessary that the body side **210** or bottom **204** be transparent. For instance, any portion of the bookpack aligned with the wearer's back, such as body side **210**, will by necessity be blocked by the wearer's body when viewed from the front. Thus, there is obviously no need for body side **210** to be adapted for see-through viewing. Likewise, it is typically unlikely that the bottom side **204** of body **200** need be transparent.

On the other hand, and as shown in FIG. **9** for the bottom side **204**, it is not absolutely necessary that such a transparent embodiment contain a conventional bottom side **204** or body side **210**. This logic can also be extended such that any combination of transparent or see-through panels and conventional opaque panels is within the scope of the invention.

It should also be noted that a particular side or panel can contain both opaque and transparent sections. For instance, if a small window of clear plastic is built into conventional opaque Nylon lateral panel **206**, the purposes of the invention are well-served.

FIG. **9** shows one configuration of the invention on a wearer. In use, a wearer would either load the interior compartment of the bookpack **200** with various contents or first strap the backpack on prior to loading.

In either event, when putting on the bookpack, the wearer will first place their left and right arm through gap between the body **200** and the appropriate left or right shoulder support members **300**, adjusting them to bring the body **200** as close to the wearer's back as possible without being uncomfortable. If present, adjustable sternum strap can be connected and adjusted as well.

Next, side straps, bottom straps, and top straps, if present, are each adjusted for optimum comfort and functionality using any one of various adjustment devices as are well-known in the art. When the various adjustment means have made, the full advantages of the invention are realized.

Note that the load borne by the wearer through the shoulder straps **300**, idealized as a distributed load **900** spanning the shoulder and chest area, is more evenly spread throughout the length of straps **300** than the conventional backpack of FIG. **1**.

Such an even weight distribution is a direct function of the various features and advantages of the present design. Each of the various top straps, side straps and bottom straps act not only to move the CG **910** up and in towards the wearer's body, but they each significantly redistribute the load borne by the wearer's shoulders via the shoulder straps **300** along a longer portion of the wearer's body and back as well.

In particular, and as shown in FIG. **7**, side straps **400**, connected through their distal ends **420** to the distal ends of shoulder straps **300**, act to redirect the load of the bookpack body **200** in the direction of the side straps **400**. The CG **910** is now located between the wearer's body and second seam **214** where the side member proximal end **410** of strap **400** attaches to bookpack body **200**, redirecting the load in the direction of the straps **400**. Accordingly, the "hinge point" of conventional bookpacks is effectively removed. This helps to distribute the weight of the bookpack more evenly around the strap and across the back as shown in FIG. **9**.

The rigid bottom, either by way of a bottom side **204** having a higher stiffness than the other panels, or by way of (or in addition to) a bottom strap or member **500**, also adds to the functionality of the present invention. As previously discussed, a rigid body bottom helps to maintain the square shape of the bookpack body **200** by lifting and directing the load towards the wearer's body and shoulders. In addition, side straps **400** also serve to increase the overall rigidity of the lower portion of the backpack body **200**, and works quite effectively in conjunction with the rigid bottom to serve this purpose.

By attaching the distal end **520** of the bottom strap **500** to the distal end **320** of shoulder strap **300** a portion of the load borne by the wearer through this connection point is distributed to the bottom strap **500**. This serves to keep the shoulder strap **300** from cinching up under the wearer's arm, enhancing the wearer's load-carrying capability and overall comfort.

It is understood that the above advantages of the rigid bottom can be realized alone or in enhanced fashion when operating in conjunction with bottom support members **570**.

Finally, top straps or members **600**, working alone or in conjunction with top support members **640**, act through its point of attachment at or near the fourth juncture to keep the bookpack body **200** square along the top. They also redirect the forces acting on the shoulder straps **300** along the top straps **600**, again reducing the load placed on the wearer's shoulders.

These features create an automatic suspension system in which the center of gravity of the backpack is moved higher and closer to the wearer's body, and the load borne by the wearer's shoulders is redistributed along a longer portion of the wearer's body and back. Such a system allows the wearer to realize the advantages of the system by carrying more weight for longer periods of time with less discomfort, pound-for-pound experienced with conventional bookpacks.

This invention has been described and specific examples of the invention have been portrayed. The use of those specific examples is not intended to limit the invention in any way. Additionally, to the extent that there are variations of the invention which are within the spirit of the disclosure and yet are equivalent to the inventions found in the claims, it is our intent that those claims cover those variations as well.

What is claimed is:

1. An ergonomic backpack comprising:

a backpack body having a top side, a bottom side, two lateral sides, a body side, and an outer side,

at least two shoulder support members, each shoulder support member having a distal end and a proximal end, the shoulder support member proximal end connected to the backpack body at a first juncture between the top side and the body side, and

at least one side support member disposed adjacent one of the lateral sides and having a proximal end connected to the backpack body at a second juncture between the outer side and one of the lateral sides and a distal end connected to one of the shoulder support members.

2. The backpack of claim 1 where at least one of the top side, the bottom side, the two lateral sides, the body side, and the outer side is at least partially transparent.

3. The backpack of claim 2 where at least one of the top side, the bottom side, the two lateral sides, the body side, and the outer side comprises a mesh.

4. The backpack of claim 2 where at least one of the top side, the bottom side, the two lateral sides, the body side, and the outer side comprises one or more straps.

5. The backpack of claim 1 additionally comprising a bottom member having

(1) a proximal end connected to the backpack body at a third juncture between said outer side and said bottom side, and

(2) two distal ends, each distal end connected to the distal end of each shoulder support member.

6. The backpack of claim 5 additionally comprising at least one bottom support member having, a proximal end connected to the bottom side and a distal end connected to the bottom member.

7. The backpack of claim 1 additionally comprising two bottom members, each bottom member having

(1) a proximal end connected to the backpack body at the third juncture, and

(2) a distal end connected to the distal end of each shoulder support member.

8. The backpack of claim 7 additionally comprising at least one bottom support member having a proximal end connected to the bottom side and a distal end connected to one of the bottom members.

9. The backpack of claim 1 additionally comprising a top member having

(1) a proximal end connected to the backpack body at a fourth juncture between the top side and the outer side, and

(2) two distal ends, each distal end connected to one of each of the shoulder support members.

10. The backpack of claim 9 additionally comprising at least one top support member having a proximal end connected to the top side and a distal end connected to the top member.

11. The backpack of claim 1 additionally comprising two top members, each top member having

(1) a proximal end connected to the backpack body at the fourth juncture, and

(2) a distal end connected to one of the shoulder support members.

12. The backpack of claim 11 additionally comprising at least one top support member having a proximal end connected to the top side and a distal end connected to one of the top members.

13. The backpack of claim 1 additionally comprising a lumbar support member disposed adjacent the body side.

14. The backpack of claim 1 additionally comprising a yoke disposed along the backpack body at the first juncture and connected to each shoulder strap.

15. The backpack of claim 1 additionally comprising a backpack body interior compartment and wherein items, when placed into the interior compartment, are visible to the human eye.

16. An ergonomic backpack comprising:

a backpack body having a top side, a bottom side, two lateral sides, a body side, and an outer side,

at least two shoulder support members, each shoulder support member having a distal end and a proximal end, the shoulder support member proximal end connected to the backpack body at a first juncture between the top side and the body side,

at least one side support member disposed adjacent one of the lateral sides and having a proximal end connected to the backpack body at a second juncture between the outer side and one of the lateral sides and a distal end connected to one of the shoulder support members, and

at least one bottom member having a proximal end connected to the backpack body at a third juncture between the outer side and the bottom side, and at least one distal end connected to the distal end of one of the shoulder support members.

17. The backpack of claim 16 where at least one of the top side, the bottom side, the two lateral sides, the body side, and the outer side is at least partially transparent.

18. The backpack of claim 16 where the bottom side has a higher stiffness than the top side, the two lateral sides, the body side, and the outer side.

19. An ergonomic backpack comprising:

a backpack body having an interior compartment, a top side, a bottom side, two lateral sides, a body side, and an outer side,

a pair of shoulder straps, each shoulder strap having a distal end and a proximal end, the proximal end connected to the backpack body at a first juncture between the top side and the body side,

a pair of side straps, each side strap disposed adjacent one of the lateral sides and having a proximal end connected to the backpack body at a second juncture between one of the lateral sides and the outer side, and a distal end connected to one of the shoulder support members, and

a pair of bottom straps, each bottom strap having a proximal end connected to the backpack body at a third juncture between the outer side and the bottom side and a distal end connected to each of the shoulder strap distal ends, each bottom strap at least partially disposed adjacent the bottom side,

at least one bottom support strap having a proximal end connected to the bottom side and a distal end connected to one of the bottom straps,

a pair of top straps, each top strap having a proximal end connected to the backpack body at a fourth juncture between the top side and the outer side and a distal end connected to each of the shoulder support straps,

at least one top support strap having a proximal end connected to the backpack body top side and a distal end connected to one of the top straps, and

a lumbar support member disposed adjacent the body side.

20. The backpack of claim 19 wherein items, when placed into the interior compartment, are visible to the human eye.

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